1444E

Drinking Water Surveillance Program

CENTRAL HALDIMAND-NORFOLK WATER TREATMENT PLANT

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CENTRAL HALDIMAND-NORFOLK WATER TREATMENT PLANT

DRINKING WATER SURVEILLANCE PROGRAM

ANNUAL REPORT 1989

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FEBRUARY 1991

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PIBS 1444E

EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

CENTRAL HALDIMAND-NORFOLK WATER TREATMENT PLANT
1989 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1989, 65 supplies were being monitored.

The Central Haldimand-Norfolk Water Treatment Plant treats water from Lake Erie using conventional treatment. The process consists of coagulation, flocculation, sedimentation using an Upflow Solids Contact Clarifier, filtration and disinfection. The Central Haldimand-Norfolk plant has a design capacity of 15.9 X 1000 M^3/day and supplies a population of approximately 4,000.

Water samples from the plant, raw and treated and two distribution system sites, were taken on a monthly basis beginning in March and analyzed for the presence of approximately 180 parameters. Parameters were divided into the following groups: Bacteriological, Inorganic and Physical (Laboratory Chemistry, Field Chemistry and Metals) and Organic (Chloroaromatics, Chlorophenols, Pesticides and PCB, Phenolics, Polyaromatic Hydrocarbons, Specific Pesticides and Volatiles). Samples were analyzed for Clorophenols and Specific Pesticides in June and November only.

A summary of results is shown in Table A.

Inorganic and Physical parameters were below any applicable health related guidelines.

Samples were analyzed monthly for the presence of approximately 110 Organics. Levels did not exceed health related guidelines.

During 1989, the DWSP sampling results indicated that the Central Haldimand-Norfolk Water Treatment Plant produced good quality water at the plant and this quality was maintained in the distribution system.

TABLE A

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS

SUMMARY TABLE BY SCAN

		RAW			TREATED			SITE 1			SITE 2		
	SCAN	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE
	BACTERIOLOGICAL	24	19	79	24	1	4	9	2	22	24	4	16
	CHEMISTRY (FLD)	30	27	90	53	52	98	34	33	97	84	74	88
	CHEMISTRY (LAB)	189	154	81	189	135	71	148	121	81	296	241	81
	METALS	216	115	53	216	97	44	188	93	49	376	198	52
	CHLOROAROMATICS	126	0	0	126	0	0	56	0	0	112	0	0
	CHLOROPHENOLS	6	0	0	6	0	0	.	.	.	.	.	.
	PAH	143	0	0	143	0	0	.	.	.	.	.	.
	PESTICIDES & PCB	306	0	0	306	0	0	123	0	0	233	0	0
	PHENOLICS	8	5	62	9	4	44	.	.	.	.	.	.
	SPECIFIC PESTICIDES	34	0	0	34	0	0	4	0	0	8	0	0
	VOLATILES	261	0	0	261	36	13	116	16	13	174	24	13
TOTAL		1343	320		1367	325		678	265		1307	541	

NO KNOWN HEALTH RELATED GUIDELINES WERE EXCEEDED.

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

DRINKING WATER SURVEILLANCE PROGRAM

CENTRAL HALDIMAND-NORFOLK WATER TREATMENT PLANT
1989 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1989, 65 plants were being monitored. Appendix A carries a full description of the DWSP.

The DWSP was initiated for the Central Haldimand-Norfolk Water Treatment Plant in March of 1989.

This report contains information and results for 1989.

PLANT DESCRIPTION

The Central Haldimand-Norfolk Water Treatment Plant is a conventional treatment plant that treats water from Lake Erie. The process consists of coagulation, flocculation, sedimentation using and Upflow Solids Contact Clarifier, filtration and disinfection. Powdered Activated Carbon is added for taste and odour control. The Central Haldimand-Norfolk plant has a design capacity of 15.9 X

1000 M^3/day and flows for day of sampling ranging from 1.6 x 1000 m^3/day to 6.0 x 1000 m^3/day. The plant serves a population of approximately 4,000.

The plant location is shown in Figure 1. Plant process details, in a block schematic, are shown in Figure 2. General plant information is presented in Table 2.

SAMPLING LOCATIONS

Water samples were obtained from four DWSP approved locations;

i) Raw - The water originated from the lowlift discharge prior to chlorination and was sampled through steel sample line. The sample tap is located on the lowlift discharge line inside the main building.

ii) Treated - The water originated from the highlift discharge after addition of all treatment chemicals and was sampled through a stainless steel sample line. The sample tap is located on the highlift discharge line.

iii) Site 1 - The distance of this site from the plant is unavailable as is the type of plumbing through which the water is sampled and the location of the sample tap.

iv) Site 2 - The distance of this site from the plant is unavailable as is the type of plumbing through which the water is sampled and the location of the sample tap.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained: a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples are used to make an assessment of the amount by which the levels of inorganic compounds and metals may be changed on standing, due to leaching from (or deposition on), the plumbing system. The only analysis carried out on the standing samples, therefore, are General Chemistry and Metals. The free flow sample represented fresh water from the distribution main that had been flowing at the sample tap for five minutes before being sampled.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. The retention time was calculated by dividing the volume of water

FIGURE 1

DRINKING WATER SURVEILLANCE PROGRAM

SITE LOCATION MAP

CENTRAL HALDIMAND-NORFOLK WATER TREATMENT PLANT

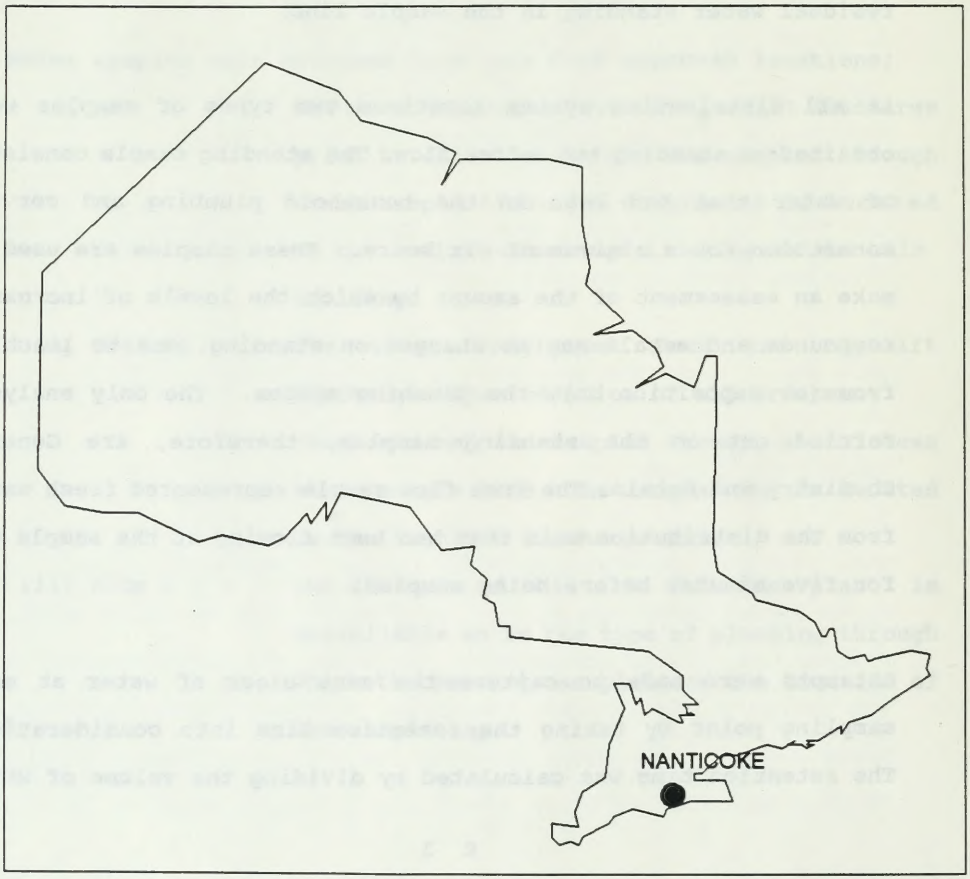

FIGURE 2

CENTRAL–HALDIMAND NORFOLK WTP

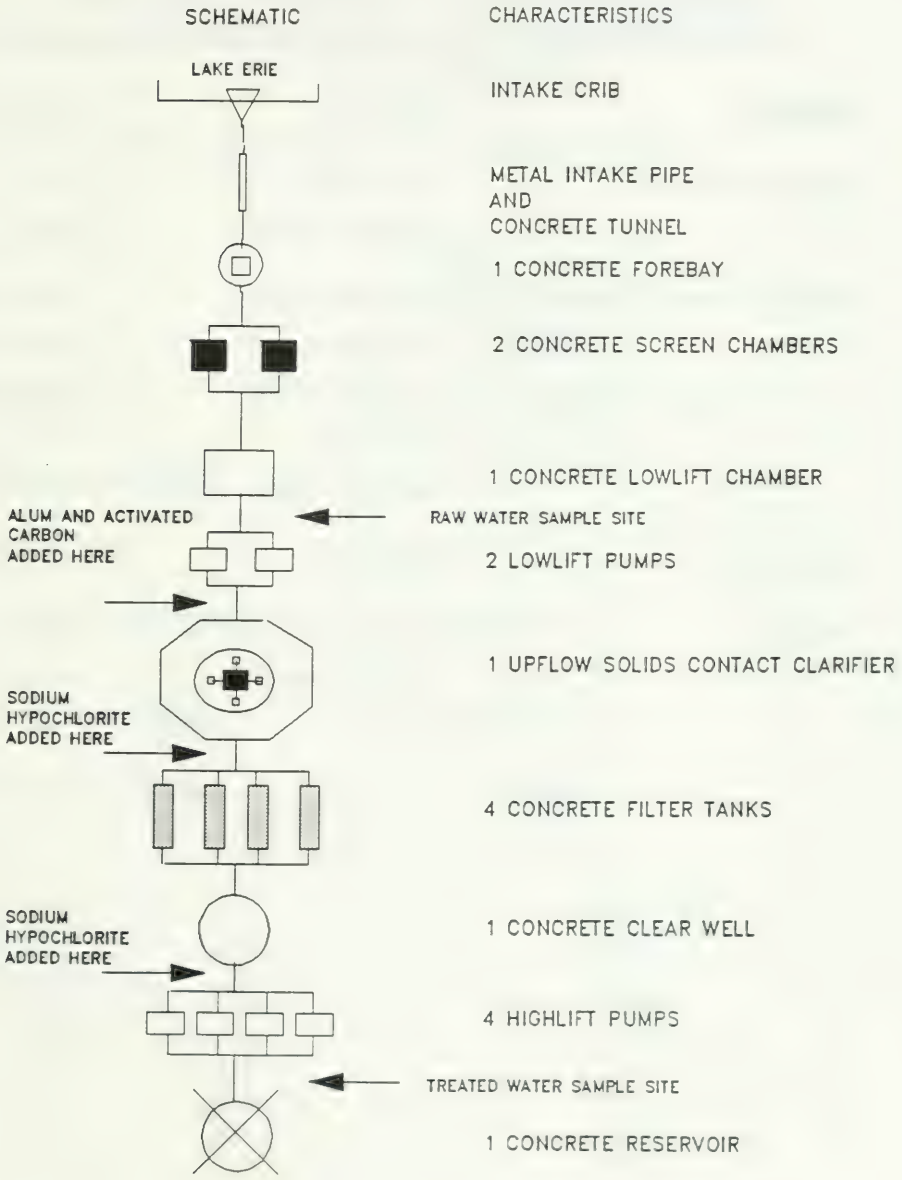

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM ANNUAL REPORT

IN-PLANT MONITORING CENTRAL HALDIMAND NORFOLK WTP 1989

PARAMETER	LOCATION	FREQUENCY
Aluminum residual	Raw water	daily
	Treated water	daily
Chlorine residual-free	Treated water	continuous
combined	Treated water	intermittent
total	Treated water	intermittent
pH	Raw water	daily
	Treated water	daily
Temperature	Raw water	continuous
Turbidity	Raw water	daily
	Treated water	continuous

TABLE 2

DRINKING WATER SURVEILLANCE PROGRAM ANNUAL REPORT

GENERAL INFORMATION

CENTRAL HALDIMAND-NORFOLK WATER TREATMENT PLANT

LOCATION:	BOX 400 NANTICOKE, ONTARIO N0A 1L0 (519-587-4565)
SOURCE:	RAW WATER SOURCE - LAKE ERIE
DESIGN CAPACITY:	15.9 x 1000M^3/DAY
OPERATION:	MINISTRY
PLANT SUPERINTENDENT:	G. KEMPENAAR
MINISTRY REGION:	WEST CENTRAL
DISTRICT OFFICER:	MR. B. CREAMER

MUNICIPALITY SERVED	POPULATION
HAGERSVILLE	2268
JARVIS	1174
TOWNSEND	537

between the two sampling points by the sample day flow. For example, if it was determined that the retention time within the plant was five hours then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner.

The Central Haldimand-Norfolk Water Treatment Plant, raw and treated water and two distribution system locations were sampled for the presence of approximately 180 parameters on a monthly basis beginning in March. Samples were analyzed for Specific Pesticides and Chlorophenols in June and November only. Only the raw and treated water at the plant was analyzed for Polynuclear Aromatic Hydrocarbons and Phenolics. As of August, the analysis of triazine pesticides was dropped from the distribution system. Laboratory analysis was conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements such as Turbidity, Chlorine Residuals, pH and

Temperature were recorded on the day of sampling and were entered onto the DWSP data base as submitted by plant personnel.

Table 3 contains information on the sample day retention time, flow rate and treatment chemicals used and their associated dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment (MOE) laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

General

Water quality is judged by comparison with the Ontario Drinking Water Objectives (ODWOs) as defined in the 1984 publication (ISBN 0-7743-8985-0). The Province of Ontario has health related and aesthetic objectives for 49 parameters. These are currently under review. When an ODWO is not available, guidelines/limits from other agencies are consulted. The Parameter Listing System (PALIS), recently published (ISBN 0-7729-4461-X) by the MOE, catalogues and keeps current over 1750 guidelines for 650 parameters from agencies throughout the world.

Although some of the parameters measured on DWSP may be present in the raw and treated water as a result of pollution, many of the compounds detected are naturally occurring or are treatment by-products.

Plant operational personnel address occurrences of taste and odour or biological water quality parameters. The DWSP does not assess these aspects of the water supply.

As stated under Results, traces do not indicate quantifiable results as defined by established MOE laboratory analytical reporting protocols. While they can be useful in trend analysis or confirmation of the presence of a specific contaminant that is

repeatedly detected at these levels, the occasional finding of a trace level of a contaminant is not considered to be significant. **DISCUSSION OF GUIDELINES AND LIMITS THEREFORE, IS ONLY CONDUCTED ON POSITIVE RESULTS.**

Bacteriology

Positive results for the Bacteriology scan were present once in the treated water, twice in the Site 1 water and four times in the Site 2 water. The positive parameters were Standard Plate Count and Total Coliform Background.

Standard Plate Count is a test used to supplement routine analysis for Coliform bacteria. The limit for Standard Plate Count (at 35°C after 48 hours) in the ODWOs is 500 organisms per mL (based on a geometric mean of 5 or more samples). High Standard Plate Counts were present in two Site 2 water samples. While no indicators of unsafe water were detected at this time, the high Standard Plate Count may generally be a result of the higher temperatures in the summer months.

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. The routine monitoring program usually requires the taking of multiple samples in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single

samples. Further, bacteriological limits were developed in acknowledgement that the presence of coliforms may be detected due to their non-uniform distribution throughout the distribution system and the fact that their enumeration is subject to considerable variation. Routine bacteriological monitoring, as outlined in the ODWOs, is carried out by the operating authority.

Inorganic and Physical

Laboratory and Field Chemistry

The results for the Laboratory Chemistry and Field Chemistry scans were below any applicable health related ODWOs.

It is desirable that the Temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of the delivered water may increase in the distribution system due to the warming effect of the soil in late summer and fall and/or as a result of higher temperatures in the source water. The desired ODWO was exceeded four times in the treated waters.

The ODWO recommend a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters, to provide an acceptable balance between corrosion and encrustation. Water supplies with a

hardness greater than 200 mg/L are considered poor and would possess a tendency to form scale deposits and result in excessive soap consumption. The Central Haldimand-Norfolk water had hardness values ranging from 125 mg/L to 150.9 mg/L.

The Langelier Index is used extensively in estimating the corrosion potential of water. An increasingly negative index indicates the increasing possibility of corrosion. It is considered sound engineering practice to maintain a slightly positive Langelier Index. The Langelier Index for Central Haldimand-Norfolk is consistently positive.

Metals

The results reported for the Metals scan were below any applicable health related ODWOs.

Iron and Manganese levels were lower in the treated water as compared to the raw water. This is a result of the treatment process. The addition of Alum as a coagulant to the raw water and the resulting coagulation/settling process has been shown to reduce the levels of most metals.

Elevated levels of Cadmium, Copper, Lead and Zinc were detected in the standing samples as compared to the free flow distribution samples, indicating that very small quantities of these metals were leached from the household plumbing as the water stood overnight.

Although the Langelier Index indicates minimal potential for corrosion, some metals will be leached in standing samples in most supplies.

At present, there is no evidence that Aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of residual Aluminum in the treated water is important to indicate the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as Al in the water leaving the plant to avoid problems in the distribution system. Aluminum values exceeded the ODWO operational guideline in two plant treated water samples.

Organic Parameters

Chloroaromatics

The results of the Chloroaromatics scan showed that no chloroaromatics were detected.

Chlorophenols

The results of the Chlorophenols scan showed that no Chlorophenols were detected.

The maximum desirable concentration of phenolic substances in drinking water is 2.0 ug/L. This limit has been set primarily to prevent the occurrence of undesirable tastes and odours,

particularly in chlorinated water. Phenolics were detected at levels ranging from 0.6 to 3.2 ug/L in the raw water and 0.6 to 1.6 ug/L in the treated water.

Pesticides and PCB (Polychlorinated Biphenyls)

The results of the Pesticides and PCB scan showed that no PCBs were detected and that two pesticides were detected:

Alpha BHC

Atrazine

There are several isomers of BHC (Benzene Hexachloride). Gamma BHC is the active ingredient of the pesticide Lindane while alpha BHC is the isomer predominantly found in surface waters from the Great Lakes Basin as indicated in results from other water supplies on DWSP.

Alpha BHC was detected at trace levels; three times in the raw water, four times in the treated water, once in the Site 1 water and four times in the Site 2 water.

Atrazine was detected at a trace level once in the treated water.

Specific Pesticides

Results of the Specific Pesticides scan showed that no specific pesticides were detected.

Polyaromatic Hydrocarbons (PAHs)

The results of the PAH scan showed that no PAHs were detected.

Volatiles

The results of the Volatiles scan showed that seven parameters, other than Trihalomethanes (THMs), were detected:

Benzene
Toluene
Ethylbenzene
M-Xylene
O-Xylene
Styrene
1,1,1 Trichloroethane

The detection of benzene, ethylbenzene, toluene and the xylenes at low, trace levels is a laboratory artifact derived from the analytical methodology.

The detected trace levels of Styrene are also considered to be laboratory artifacts resulting from the polystyrene shipping containers. The sporadic background levels from this source are in the order of 0.05 µg/L.

1,1,1 Trichloroethane was detected at trace levels; once in the raw water and once in the treated water.

THMs are acknowledged to be produced during the water treatment process and will always occur in chlorinated surface waters. THMs are comprised of Chloroform, Chlorodibromomethane and Dichlorobromomethane. Bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs.

Chloroform, Dichlorobromomethane, Chlorodibromomethane and Total THMs were detected in all treated water samples. Bromoform was detected at trace levels. All Total THM occurrences, ranging from 20.35 to 48.5 ug/L were well below the ODWO of 350 ug/L.

CONCLUSIONS

The Central Haldimand-Norfolk Water Treatment Plant for the sample year of 1989 produced good quality water at the plant and this quality was maintained in the distribution system.

No health related guidelines, for organic or inorganic parameters, were exceeded during 1989.

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS SAMPLE DAY CONDITIONS FOR 1989

	SAMPLE DAY CONDITIONS		TREATMENT CHEMICAL DOSAGES (MG/L)		
			PRE-CHLORINATION	COAGULATION	POST-CHLORINATION
			CHLORINE	ALUM LIQUID	CHLORINE
DATE	RETENTION TIME(HRS)	FLOW (1000M3)			
MAR 13	.	.	1.00	28.80	1.10
APR 10	.	1.6	.76	21.40	.58
MAY 10	.	4.9	.73	32.00	.29
JUN 14	.	3.9	.68	12.70	.56
JUL 12	.	5.9	.54	14.80	.52
SEP 12	.	6.0	.78	16.30	1.10
OCT 11	.	5.2	.75	18.10	.91
NOV 08	.	.	.38	2.54	.65
DEC 06	.	.	1.00	20.50	1.40

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK

SUMMARY TABLE OF RESULTS (1989)

SCAN	PARAMETER	RAW			TREATED			SITE 1			SITE 2		
		TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL	FECAL COLIFORM MF	8	4	0	.	.	.	.	.	.	.	.	.
	STANDRD PLATE CNT MF	.	.	.	8	0	0	3	2	0	8	3	0
	TOTAL COLIFORM MF	8	7	0	8	0	0	3	0	0	8	0	0
	T COLIFORM BCKGRD MF	8	8	0	8	1	0	3	0	0	8	1	0
*TOTAL SCAN BACTERIOLOGICAL		24	19	0	24	1	0	9	2	0	24	4	0
*TOTAL GROUP BACTERIOLOGICAL		24	19	0	24	1	0	9	2	0	24	4	0
CHEMISTRY (FLD)	FLD CHLORINE (COMB)	1	0	0	9	8	0	7	6	0	15	10	0
	FLD CHLORINE FREE	1	0	0	9	9	0	7	7	0	12	9	0
	FLD CHLORINE (TOTAL)	1	0	0	9	9	0	5	5	0	15	13	0
	FLD PH	9	9	0	9	9	0	7	7	0	16	16	0
	FLD TEMPERATURE	9	9	0	8	8	0	7	7	0	16	16	0
	FLD TURBIDITY	9	9	0	9	9	0	1	1	0	10	10	0
*TOTAL SCAN CHEMISTRY (FLD)		30	27	0	53	52	0	34	33	0	84	74	0
CHEMISTRY (LAB)	ALKALINITY	9	9	0	9	9	0	8	8	0	16	16	0
	CALCIUM	9	9	0	9	9	0	8	8	0	16	16	0
	CYANIDE	9	0	0	9	0	0	4	0	0	8	0	0
	CHLORIDE	9	9	0	9	9	0	8	8	0	16	16	0
	COLOUR	9	1	8	9	0	9	8	0	7	16	0	15
	CONDUCTIVITY	9	9	0	9	9	0	8	8	0	16	16	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK

SUMMARY TABLE OF RESULTS (1989)

		SITE											
		RAW			TREATED			SITE 1			SITE 2		
SCAN	PARAMETER	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
CHEMISTRY (LAB)	FLUORIDE	9	9	0	9	9	0	8	8	0	16	16	0
	HARDNESS	9	9	0	9	9	0	8	8	0	16	16	0
	IONCAL	9	9	0	9	9	0	8	8	0	16	15	0
	LANGELIERS INDEX	9	9	0	9	9	0	8	8	0	16	16	0
	MAGNESIUM	9	9	0	9	9	0	8	8	0	16	16	0
	SODIUM	9	9	0	9	9	0	8	8	0	16	16	0
	AMMONIUM TOTAL	9	6	2	9	1	2	8	0	2	16	3	7
	NITRITE	9	4	5	9	0	6	8	1	6	16	2	11
	TOTAL NITRATES	9	9	0	9	9	0	8	8	0	16	14	1
	NITROGEN TOT KJELD	9	9	0	9	9	0	8	8	0	16	16	0
	PH	9	9	0	9	9	0	8	8	0	16	16	0
	PHOSPHORUS FIL REACT	9	2	6	9	0	1	.	.	.	.	.	.
	PHOSPHORUS TOTAL	9	6	3	9	0	5	.	.	.	.	.	.
	SULPHATE	9	9	0	9	9	0	8	8	0	16	16	0
	TURBIDITY	9	9	0	9	8	1	8	8	0	16	15	1
*TOTAL SCAN CHEMISTRY (LAB)		189	154	24	189	135	24	148	121	15	296	241	35
METALS	SILVER	9	0	2	9	0	4	8	0	3	16	0	5
	ALUMINUM	9	9	0	9	9	0	8	8	0	16	16	0
	ARSENIC	9	3	6	9	0	9	8	1	7	16	0	15
	BARIUM	9	9	0	9	9	0	8	8	0	16	16	0
	BORON	9	9	0	9	9	0	8	8	0	16	16	0
	BERYLLIUM	9	0	3	9	0	3	8	0	4	16	0	12

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK

SUMMARY TABLE OF RESULTS (1989)

		SITE											
		RAW			TREATED			SITE 1			SITE 2		
SCAN	PARAMETER	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
METALS	CADMIUM	9	0	4	9	0	2	8	0	2	16	0	6
	COBALT	9	0	9	9	0	9	8	0	6	16	0	14
	CHROMIUM	9	3	4	9	3	5	8	4	4	16	12	4
	COPPER	9	9	0	9	6	3	8	8	0	16	16	0
	IRON	9	7	2	9	0	6	8	0	4	16	0	6
	MERCURY	9	0	3	9	0	4	4	0	2	8	0	4
	MANGANESE	9	9	0	9	9	0	8	5	3	16	14	2
	MOLYBDENUM	9	9	0	9	9	0	8	8	0	16	16	0
	NICKEL	9	0	6	9	1	6	8	0	5	16	2	12
	LEAD	9	4	5	9	3	3	8	7	1	16	16	0
	ANTIMONY	9	9	0	9	9	0	8	7	1	16	16	0
	SELENIUM	9	0	4	9	0	7	8	1	5	16	2	11
	STRONTIUM	9	9	0	9	9	0	8	8	0	16	16	0
	TITANIUM	9	9	0	9	8	1	8	7	1	16	16	0
	THALLIUM	9	0	4	9	0	5	8	0	3	16	0	5
	URANIUM	9	8	1	9	6	3	8	5	3	16	8	8
	VANADIUM	9	0	9	9	0	9	8	0	8	16	0	16
	ZINC	9	9	0	9	7	2	8	8	0	16	16	0
*TOTAL SCAN METALS		216	115	62	216	97	81	188	93	62	376	198	120
*TOTAL GROUP INORGANIC & PHYSICAL		435	296	86	458	284	105	370	247	77	756	513	155
CHLOROAROMATICS	HEXACHLOROBUTADIENE	9	0	0	9	0	0	4	0	0	8	0	0
	123 TRICHLOROBENZENE	9	0	0	9	0	0	4	0	0	8	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK

SUMMARY TABLE OF RESULTS (1989)

		SITE											
		RAW			TREATED			SITE 1			SITE 2		
SCAN	PARAMETER	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
CHLOROAROMATICS	1234 T-CHLOROBENZENE	9	0	0	9	0	0	4	0	0	8	0	0
	1235 T-CHLOROBENZENE	9	0	0	9	0	0	4	0	0	8	0	0
	124 TRICHLOROBENZENE	9	0	0	9	0	0	4	0	0	8	0	0
	1245 T-CHLOROBENZENE	9	0	0	9	0	0	4	0	0	8	0	0
	135 TRICHLOROBENZENE	9	0	0	9	0	0	4	0	0	8	0	0
	HCB	9	0	0	9	0	0	4	0	0	8	0	0
	HEXACHLOROETHANE	9	0	0	9	0	0	4	0	0	8	0	0
	OCTACHLOROSTYRENE	9	0	0	9	0	0	4	0	0	8	0	0
	PENTACHLOROBENZENE	9	0	0	9	0	0	4	0	0	8	0	0
	236 TRICHLOROTOLUENE	9	0	0	9	0	0	4	0	0	8	0	0
	245 TRICHLOROTOLUENE	9	0	0	9	0	0	4	0	0	8	0	0
	26A TRICHLOROTOLUENE	9	0	0	9	0	0	4	0	0	8	0	0
*TOTAL SCAN CHLOROAROMATICS		126	0	0	126	0	0	56	0	0	112	0	0
CHLOROPHENOLS	234 TRICHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.
	2345 T-CHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.
	2356 T-CHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.
	245-TRICHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.
	246-TRICHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.
	PENTACHLOROPHENOL	1	0	0	1	0	0	.	.	.	.	.	.
*TOTAL SCAN CHLOROPHENOLS		6	0	0	6	0	0	0	0	0	0	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK

SUMMARY TABLE OF RESULTS (1989)

		SITE											
		RAW			TREATED			SITE 1			SITE 2		
SCAN	PARAMETER	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PAH	PHENANTHRENE	9	0	0	9	0	0	.	.	.	.	.	.
	ANTHRACENE	8	0	0	8	0	0	.	.	.	.	.	.
	FLUORANTHENE	9	0	0	9	0	0	.	.	.	.	.	.
	PYRENE	9	0	0	9	0	0	.	.	.	.	.	.
	BENZO(A)ANTHRACENE	9	0	0	9	0	0	.	.	.	.	.	.
	CHRYSENE	9	0	0	9	0	0	.	.	.	.	.	.
	DIMETH. BENZ(A)ANTHR	4	0	0	4	0	0	.	.	.	.	.	.
	BENZO(E) PYRENE	9	0	0	9	0	0	.	.	.	.	.	.
	BENZO(B) FLUORANTHEN	9	0	0	9	0	0	.	.	.	.	.	.
	PERYLENE	9	0	0	9	0	0	.	.	.	.	.	.
	BENZO(K) FLUORANTHEN	9	0	0	9	0	0	.	.	.	.	.	.
	BENZO(A) PYRENE	5	0	0	5	0	0	.	.	.	.	.	.
	BENZO(G,H,I) PERYLEN	9	0	0	9	0	0	.	.	.	.	.	.
	DIBENZO(A,H) ANTHRAC	9	0	0	9	0	0	.	.	.	.	.	.
	INDENO(1,2,3-C,D) PY	9	0	0	9	0	0	.	.	.	.	.	.
	BENZO(B) CHRYSENE	9	0	0	9	0	0	.	.	.	.	.	.
	CORONENE	9	0	0	9	0	0	.	.	.	.	.	.
*TOTAL SCAN PAH		143	0	0	143	0	0	0	0	0	0	0	0
PESTICIDES & PCB	ALDRIN	9	0	0	9	0	0	4	0	0	8	0	0
	ALPHA BHC	9	0	3	9	0	4	4	0	1	8	0	4
	BETA BHC	9	0	0	9	0	0	4	0	0	8	0	0
	LINDANE	9	0	0	9	0	0	4	0	0	8	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK

SUMMARY TABLE OF RESULTS (1989)

		SITE											
		RAW			TREATED			SITE 1			SITE 2		
SCAN	PARAMETER	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PESTICIDES & PCB	ALPHA CHLORDANE	9	0	0	9	0	0	4	0	0	8	0	0
	GAMMA CHLORDANE	9	0	0	9	0	0	4	0	0	8	0	0
	DIELDRIN -	9	0	0	9	0	0	4	0	0	8	0	0
	METHOXYCHLOR	9	0	0	9	0	0	4	0	0	8	0	0
	ENDOSULFAN 1	9	0	0	9	0	0	4	0	0	8	0	0
	ENDOSULFAN II	9	0	0	9	0	0	4	0	0	8	0	0
	ENDRIN	9	0	0	9	0	0	4	0	0	8	0	0
	ENDOSULFAN SULPHATE	9	0	0	9	0	0	4	0	0	8	0	0
	HEPTACHLOR EPOXIDE	9	0	0	9	0	0	4	0	0	8	0	0
	HEPTACHLOR	9	0	0	9	0	0	4	0	0	8	0	0
	MIREX	9	0	0	9	0	0	4	0	0	8	0	0
	OXYCHLORDANE	9	0	0	9	0	0	4	0	0	8	0	0
	OPDDT	9	0	0	9	0	0	4	0	0	8	0	0
	PCB	9	0	0	9	0	0	4	0	0	8	0	0
	DDD	9	0	0	9	0	0	4	0	0	8	0	0
	PPDDE	9	0	0	9	0	0	4	0	0	8	0	0
	PPDDT	9	0	0	9	0	0	4	0	0	8	0	0
	AMETRINE	9	0	0	9	0	0	3	0	0	5	0	0
	ATRAZINE	9	0	0	9	0	1	3	0	0	5	0	0
	ATRATONE	9	0	0	9	0	0	3	0	0	5	0	0
	CYANAZINE	9	0	0	9	0	0	3	0	0	5	0	0
	D-ETHYL ATRAZINE	9	0	0	9	0	0	3	0	0	5	0	0
	DES ETHYL SIMAZINE	9	0	0	9	0	0	3	0	0	5	0	0
	PROMETONE	9	0	0	9	0	0	3	0	0	5	0	0
	PROPAZINE	9	0	0	9	0	0	3	0	0	5	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK

SUMMARY TABLE OF RESULTS (1989)

		SITE											
		RAW			TREATED			SITE 1			SITE 2		
SCAN	PARAMETER	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PESTICIDES & PCB	PROMETRYNE	9	0	0	9	0	0	3	0	0	5	0	0
	METRIBUZIN (SENCOR)	9	0	0	9	0	0	3	0	0	5	0	0
	SIMAZINE	9	0	0	9	0	0	3	0	0	5	0	0
	ALACHLOR	9	0	0	9	0	0	3	0	0	5	0	0
	METOLACHLOR	9	0	0	9	0	0	3	0	0	5	0	0
*TOTAL SCAN PESTICIDES & PCB		306	0	3	306	0	5	123	0	1	233	0	4
PHENOLICS	PHENOLICS	8	5	2	9	4	4	.	.	.	.	.	.
*TOTAL SCAN PHENOLICS		8	5	2	9	4	4	0	0	0	0	0	0
SPECIFIC PESTICIDES	TOXAPHENE	9	0	0	9	0	0	4	0	0	8	0	0
	2,4,5-T	1	0	0	1	0	0	.	.	.	.	.	.
	2,4-D	1	0	0	1	0	0	.	.	.	.	.	.
	2,4-DB	1	0	0	1	0	0	.	.	.	.	.	.
	2,4 D PROPIONIC ACID	1	0	0	1	0	0	.	.	.	.	.	.
	DICAMBA	1	0	0	1	0	0	.	.	.	.	.	.
	PICHLORAM	0	0	0	0	0	0	.	.	.	.	.	.
	SILVEX	1	0	0	1	0	0	.	.	.	.	.	.
	DIAZINON	1	0	0	1	0	0	.	.	.	.	.	.
	DICHLOROVOS	1	0	0	1	0	0	.	.	.	.	.	.
	CHLORPYRIFOS	1	0	0	1	0	0	.	.	.	.	.	.

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK

SUMMARY TABLE OF RESULTS (1989)

		SITE											
		RAW			TREATED			SITE 1			SITE 2		
SCAN	PARAMETER	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
SPECIFIC PESTICIDES	ETHION	1	0	0	1	0	0	.	.	.	.	.	.
	AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.	.	.	.
	MALATHION	1	0	0	1	0	0	.	.	.	.	.	.
	MEVINPHOS	1	0	0	1	0	0	.	.	.	.	.	.
	METHYL PARATHION	1	0	0	1	0	0	.	.	.	.	.	.
	METHYLTRITHION	1	0	0	1	0	0	.	.	.	.	.	.
	PARATHION	1	0	0	1	0	0	.	.	.	.	.	.
	PHORATE	1	0	0	1	0	0	.	.	.	.	.	.
	RELDAN	1	0	0	1	0	0	.	.	.	.	.	.
	RONNEL	1	0	0	1	0	0	.	.	.	.	.	.
	AMINOCARB	0	0	0	0	0	0	.	.	.	.	.	.
	BENOMYL	0	0	0	0	0	0	.	.	.	.	.	.
	BUX	0	0	0	0	0	0	.	.	.	.	.	.
	CARBOFURAN	1	0	0	1	0	0	.	.	.	.	.	.
	CICP	1	0	0	1	0	0	.	.	.	.	.	.
	DIALLATE	1	0	0	1	0	0	.	.	.	.	.	.
	EPTAM	0	0	0	0	0	0	.	.	.	.	.	.
	IPC	1	0	0	1	0	0	.	.	.	.	.	.
	PROPOXUR	1	0	0	1	0	0	.	.	.	.	.	.
	CARBARYL	1	0	0	1	0	0	.	.	.	.	.	.
	BUTYLATE	1	0	0	1	0	0	.	.	.	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES		34	0	0	34	0	0	4	0	0	8	0	0
VOLATILES	BENZENE	9	0	1	9	0	2	4	0	0	6	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK

SUMMARY TABLE OF RESULTS (1989)

		SITE											
		RAW			TREATED			SITE 1			SITE 2		
SCAN	PARAMETER	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
VOLATILES	TOLUENE	9	0	2	9	0	6	4	0	3	6	0	2
	ETHYLBENZENE	9	0	0	9	0	4	4	0	3	6	0	3
	P-XYLENE	9	0	0	9	0	0	4	0	0	6	0	0
	M-XYLENE	9	0	0	9	0	1	4	0	0	6	0	1
	O-XYLENE	9	0	1	9	0	3	4	0	1	6	0	3
	STYRENE	9	0	3	9	0	6	4	0	3	6	0	4
	1,1 DICHLOROETHYLENE	9	0	0	9	0	0	4	0	0	6	0	0
	METHYLENE CHLORIDE	9	0	0	9	0	0	4	0	0	6	0	0
	T1,2DICHLOROETHYLENE	9	0	0	9	0	0	4	0	0	6	0	0
	1,1 DICHLOROETHANE	9	0	0	9	0	0	4	0	0	6	0	0
	CHLOROFORM	9	0	2	9	9	0	4	4	0	6	6	0
	111, TRICHLOROETHANE	9	0	1	9	0	1	4	0	0	6	0	0
	1,2 DICHLORDETHANE	9	0	0	9	0	0	4	0	0	6	0	0
	CARBON TETRACHLORIDE	9	0	0	9	0	0	4	0	0	6	0	0
	1,2 DICHLOROPROPANE	9	0	0	9	0	0	4	0	0	6	0	0
	TRICHLOROETHYLENE	9	0	0	9	0	0	4	0	0	6	0	0
	DICHLOROBROMOMETHANE	9	0	0	9	9	0	4	4	0	6	6	0
	112 TRICHLOROETHANE	9	0	0	9	0	0	4	0	0	6	0	0
	CHLORODIBROMOMETHANE	9	0	0	9	9	0	4	4	0	6	6	0
	T-CHLOROETHYLENE	9	0	0	9	0	0	4	0	0	6	0	0
	BROMOFORM	9	0	0	9	0	9	4	0	4	6	0	6
	1122 T-CHLOROETHANE	9	0	0	9	0	0	4	0	0	6	0	0
	CHLOROBENZENE	9	0	0	9	0	0	4	0	0	6	0	0
	1,4 DICHLOROBENZENE	9	0	0	9	0	0	4	0	0	6	0	0
	1,3 DICHLOROBENZENE	9	0	0	9	0	0	4	0	0	6	0	0

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK

SUMMARY TABLE OF RESULTS (1989)

		SITE											
		RAW			TREATED			SITE 1			SITE 2		
SCAN	PARAMETER	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
VOLATILES	1,2 DICHLOROBENZENE	9	0	0	9	0	0	4	0	0	6	0	0
	ETHLYENE DIBROMIDE	9	0	0	9	0	0	4	0	0	6	0	0
	TOTL TRIHALOMETHANES	9	0	0	9	9	0	4	4	0	6	6	0
*TOTAL SCAN VOLATILES		261	0	10	261	36	32	116	16	14	174	24	19
*TOTAL GROUP ORGANIC		884	5	15	885	40	41	299	16	15	527	24	23
TOTAL		1343	320	101	1367	325	146	678	265	92	1307	541	178

KEY TO TABLE 5 and 6

A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
1*. MAC for Bacteriological Analyses
Poor water quality is indicated when :
- total coliform counts > 0 < 5
- P/A Bottle Test is present after 48 hours
- Aeromonas organisms are detected in more than 25% of samples in a single submission or in successive submissions from the same sampling site
- Pseudomonas Aeruginosa, Staphylococcus Aureus and members of the Fecal Streptococcus group should not be detected in any sample
- Standard Plate Count should not exceed 500 organisms per ml at 35 ^{0}C within 48 hours
2. Interim Maximum Acceptable Concentration (IMAC)
3. Maximum Desirable Concentration (MDC)
4. Aesthetic or Recommended Operational Guideline
- hardness levels between 80 and 100 mg/L as calcium carbonate are considered to provide an acceptable balance between corrosion and incrustation, water supplies with a hardness >200 mg/L are considered poor and those in excess of 500 mg/L are unacceptable.

B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO) (for xylenes, the AO is a total)

C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV

D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria

F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissable Concentration (MADC)

G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

H USSR MAXIMUM PERMISSIBLE CONCENTRATION

I NEW YORK STATE AMBIENT WATER GUIDELINE

N/A NONE AVAILABLE

INTERPRETATION OF DATA

The interpretation of analytical results that are obtained from measurements near the limit of detection of the measurement process is subject to greater uncertainty than those at higher concentrations. The principle areas of concern relate to whether the substance has actually been detected, whether it has been properly identified, and whether it is an artifact of the measurement process. In other words, false positives can be caused by the instrumentation or the test procedures used, when in fact these compounds are not present in the sample.

There are several methods to treat data from such measurements:
1. Exclude the low-level data because of this uncertainty factor. Studies of long-term environmental trends and modelling may however, be adversely affected by the exclusion of such data.
2. Qualify these data so the user is aware of the greater uncertainty associated with their use.

For the Drinking Water Surveillance Program, measurements near the limit of detection of the measurement process are reported with the code "<T". Results qualified by "W" indicate a zero measurement. These results are reported for purposes of modelling and long-term trend analysis and no significance should be attributed to a single determination of a substance below "T" (a single determination may well be a false positive). Repeat analysis or additional data are needed before it can be stated with certainty that the substance in question was truly present. On the other hand, it is less likely that repeated detection of a substance at or near the limit of detection at a specific location is solely due to an artifact in the measurement system, and more likely represents a true positive. The average of such data however, is still only an estimate of the amount of substance present subject to the possible biases of the method used.

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurable Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!IV	No Data: Inverted Septum
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded

!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!QU	No Data: Quality Control Unacceptable
!RE	No Data: Received Empty
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
!TX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant
UAL	Unreliable: Sample Age Exceeds Normal Limit
UCR	Unreliable: Could Not Confirm By Reanalysis
UCS	Unreliable: Contamination Suspected
USD	Unreliable: Sample Decomposition Noted
UIN	Unreliable: Indeterminant Interference
XP	Positive After X Number of Hours
T≠ (T06)	Result Taken After ≠ Hours

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1989

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
BACTERIOLOGICAL						
FECAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0		GUIDELINE = 0 (A1)	
MAR	0 T24	.	.	.	.	.
APR	0	.	.	.	.	.
MAY	0	.	.	.	.	.
JUN	0	.	.	.	.	.
JUL	8	.	.	.	.	.
SEP	9	.	.	.	.	.
OCT	3	.	.	.	.	.
NOV	6	.	.	.	.	.
STANDRD PLATE CNT MF ( )			DET'N LIMIT = 0		GUIDELINE = 500/ML (A1)	
MAR	.	2 <=>	.	.	.	0 <=>
APR	.	1 <=>	.	17	.	0 <=>
MAY	.	0 <=>	.	36	.	0 <=>
JUN	.	0 <=>	.	4 <=>	.	13
JUL	.	8 <=>	.	.	.	2400 >
SEP	.	1 <=>	.	.	.	2200
OCT	.	0 <=>	.	.	.	3 <=>
NOV	.	2 <=>	.	.	.	4 <=>
TOTAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0		GUIDELINE = 5/100ML(A1)	
MAR	640 T24	0 T24	.	.	.	0 T48
APR	40 <=>	0	.	0	.	0
MAY	130	0	.	0	.	0
JUN	60 A3C	0	.	0	.	0
JUL	120 A3C	0	.	.	.	0
SEP	360 A3C	0	.	.	.	0
OCT	88 A3C	0	.	.	.	0
NOV	150 >	0	.	.	.	0
T COLIFORM BCKGRD MF (CT/100ML)			DET'N LIMIT = 0		GUIDELINE = N/A	
MAR	2020 T24	0 T24	.	.	.	0 T48
APR	560	0	.	0	.	0
MAY	930	0	.	0	.	0
JUN	3160 A3C	0	.	0	.	0
JUL	30000 A3C	0	.	.	.	0
SEP	14000 A3C	0	.	.	.	0
OCT	2440 A3C	25	.	.	.	32
NOV	2400 >	0	.	.	.	0

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1989

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (FLD)						
FLD CHLORINE (COMB) ( )			DET'N LIMIT = N/A		GUIDELINE = N/A	
MAR	.	.200	.	.	.	.200
APR	.	.400	.100	.	.100	.300
MAY	.	.300	.100	.100	.100	.100
JUN	.	.300	.100	.000	.000	.000
JUL	.000	.200	.	.	.000	.000
SEP	.	.100	.	.	.050	.050
OCT	.	.150	.	.	.000	.100
NOV	.	.200	.	.	.100	.100
DEC	.	.000	.050	.100	.	.
FLD CHLORINE FREE ( )			DET'N LIMIT = N/A		GUIDELINE = N/A	
MAR	.	1.100	.	.	.	.100
APR	.	.800	.100	.	.	.100
MAY	.	.500	.100	.100	.	.
JUN	.	.700	.100	.100	.100	.100
JUL	.000	.800	.	.	.000	.100
SEP	.	.600	.	.	.050	.050
OCT	.	.150	.	.	.000	.000
NOV	.	.900	.	.	.100	.200
DEC	.	.400	.050	.100	.	.
FLD CHLORINE (TOTAL) ( )			DET'N LIMIT = N/A		GUIDELINE = N/A	
MAR	.	1.300	.	.	.	.300
APR	.	1.200	.	.	.100	.200
MAY	.	.800	.200	.200	.100	.100
JUN	.	1.000	.	.100	.100	.100
JUL	.000	1.000	.	.	.000	.100
SEP	.	.700	.	.	.100	.100
OCT	.	1.000	.	.	.000	.100
NOV	.	1.100	.	.	.200	.300
DEC	.	.400	.100	.200	.	.
FLD PH (DMNSLESS)			DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)	
MAR	7.600	7.500	.	.	7.500	7.500
APR	7.700	7.500	7.600	.	7.600	7.600
MAY	8.000	7.700	7.600	7.600	7.800	7.800
JUN	7.700	7.300	7.800	7.800	7.700	7.700
JUL	7.800	7.500	.	.	7.800	7.800
SEP	7.800	7.600	.	.	7.800	7.800
OCT	7.800	7.500	.	.	8.000	7.800
NOV	7.800	7.400	.	.	7.800	7.900
DEC	7.700	7.100	7.600	7.700	.	.
FLD TEMPERATURE (DEG.C)			DET'N LIMIT = N/A		GUIDELINE = 15 (A1)	
MAR	5.000	5.000	.	.	10.500	9.000

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1989

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
APR	5.500	5.500	12.000	.	16.000	7.000
MAY	9.500	15.000	10.000	8.000	15.000	10.000
JUN	10.500	12.000	17.000	12.000	16.000	13.000
JUL	15.000	16.000	.	.	20.000	15.000
SEP	22.500	17.000	.	.	19.000	17.500
OCT	10.500	13.000	.	.	18.500	16.500
NOV	10.500	.	.	.	19.000	13.500
DEC	5.500	6.000	19.000	11.000	.	.
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A		GUIDELINE = 1.0 (A1)	
MAR	4.000	.200	.	.	.250	.250
APR	6.000	.080	.280	.	.320	.280
MAY	4.000	.150	.	.	.400	.350
JUN	3.100	.170	.	.	.180	.180
JUL	3.400	.180	.	.	.120	.140
SEP	3.000	.160	.	.	.	.
OCT	5.000	.140	.	.	.	.
NOV	3.000	.140	.	.	.	.
DEC	5.700	.090	.	.	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1989

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (LAB)						
ALKALINITY (MG/L)			DET'N LIMIT = .200		GUIDELINE = 30-500 (A4)	
MAR	106.800	95.300	.	.	98.500	98.700
APR	105.800	98.200	100.500	100.700	100.000	100.200
MAY	104.100	93.900	99.900	99.800	100.700	100.700
JUN	102.200	95.000	99.200	98.900	99.100	98.500
JUL	106.000	97.800	.	.	103.000	102.000
SEP	100.300	93.500	.	.	100.000	99.700
OCT	104.500	97.200	.	.	102.400	102.200
NOV	105.800	96.800	.	.	102.700	102.000
DEC	103.000	93.200	100.600	98.500	.	.
CALCIUM (MG/L)			DET'N LIMIT = .100		GUIDELINE = 100 (F2)	
MAR	38.800	38.200	.	.	40.400	40.600
APR	39.400	40.200	41.200	42.800	41.600	42.200
MAY	37.600	38.600	39.600	40.600	41.400	40.000
JUN	39.200	38.400	40.200	40.400	40.400	41.400
JUL	39.400	38.200	.	.	40.400	40.800
SEP	35.800	36.800	.	.	39.400	38.800
OCT	42.800	41.900	.	.	46.000	44.400
NOV	37.000	36.500	.	.	39.600	40.000
DEC	38.200	38.100	40.400	39.500	.	.
CHLORIDE (MG/L)			DET'N LIMIT = .200		GUIDELINE = 250 (A3)	
MAR	15.200	16.300	.	.	16.400	16.400
APR	14.900	16.900	14.100	16.700	15.900	17.300
MAY	14.400	15.500	15.800	15.800	16.000	16.000
JUN	14.200	15.800	16.200	16.100	16.300	16.200
JUL	14.400	16.000	.	.	16.000	16.000
SEP	14.800	16.600	.	.	17.100	17.000
OCT	14.300	16.300	.	.	16.300	15.900
NOV	14.600	16.300	.	.	16.800	17.000
DEC	14.600	15.900	16.500	16.000	.	.
COLOUR (HZU)			DET'N LIMIT = .5		GUIDELINE = 5.0 (A3)	
MAR	2.000 <T	.500 <T	.	.	1.000 <T	1.500 <T
APR	1.500 <T	.500 <T	.500 <T	.500 <T	BDL	.500 <T
MAY	2.000 <T	1.000 <T	1.000 <T	.500 <T	1.000 <T	.500 <T
JUN	1.500 <T	1.000 <T	1.000 <T	1.000 <T	1.000 <T	1.000 <T
JUL	2.500	1.500 <T	.	.	1.000 <T	1.000 <T
SEP	2.000 <T	1.000 <T	.	.	.500 <T	.500 <T
OCT	1.500 <T	1.000 <T	.	.	.500 <T	.500 <T
NOV	1.500 <T	.500 <T	.	.	.500 <T	.500 <T
DEC	1.000 <T	.500 <T	.500 <T	BDL	.	.
CONDUCTIVITY (UMHO/CM)			DET'N LIMIT = 1		GUIDELINE = 400 (F2)	
MAR	304	311	.	.	318	318

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1989

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
APR	309	327	336	336	333	333
MAY	301	310	317	315	317	318
JUN	291	301	308	307	309	307
JUL	295	303	.	.	312	310
SEP	288	300	.	.	313	311
OCT	296	307	.	.	316	314
NOV	298	311	.	.	320	321
DEC	288	298	311	305	.	.
FLUORIDE (MG/L)			DET'N LIMIT = .01		GUIDELINE = 2.400 (A1)	
MAR	.120	.100	.	.	.200	.100
APR	.120	.100	.120	.120	.100	.100
MAY	.120	.100	.100	.100	.100	.100
JUN	.120	.100	.100	.100	.100	.120
JUL	.120	.100	.	.	.100	.100
SEP	.120	.100	.	.	.100	.100
OCT	.060	.100	.	.	.100	.100
NOV	.140	.100	.	.	.120	.100
DEC	.140	.100	.120	.120	.	.
HARDNESS (MG/L)			DET'N LIMIT = .500		GUIDELINE = 80-100 (A4)	
MAR	131.000	129.000	.	.	135.000	136.000
APR	135.000	137.000	140.000	144.000	140.000	141.000
MAY	130.000	131.000	135.000	136.000	139.000	135.000
JUN	135.000	132.000	136.000	137.000	138.000	140.000
JUL	132.000	128.000	.	.	134.000	135.000
SEP	125.000	126.000	.	.	132.000	130.000
OCT	143.400	141.600	.	.	150.900	148.200
NOV	129.000	128.200	.	.	135.000	136.000
DEC	130.300	130.000	136.100	133.600	.	.
IONCAL (DMNSLESS)			DET'N LIMIT = N/A		GUIDELINE = N/A	
MAR	2.037	2.301	.	.	1.599	1.551
APR	.527	.463	2.353	1.954	1.101	.000 NAF
MAY	1.404	.024	.732	.792	1.384	1.334
JUN	6.165	2.081	1.838	3.538	3.856	5.636
JUL	.550	1.993	.	.	1.845	.691
SEP	1.571	2.272	.	.	2.598	3.555
OCT	8.607	6.419	.	.	9.369	7.313
NOV	3.151	4.447	.	.	3.989	2.355
DEC	3.599	1.651	2.814	2.333	.	.
LANGELIERS INDEX (DMNSLESS)			DET'N LIMIT = N/A		GUIDELINE = N/A	
MAR	.467	.279	.	.	.307	.280
APR	.528	.422	.472	.510	.385	.472 NAF
MAY	.533	.507	.524	.535	.527	.532

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1989

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
JUN	.387	.313	.379	.380	.360	.409
JUL	.474	.412	.	.	.487	.507
SEP	.471	.368	.	.	.483	.485
OCT	.563	.498	.	.	.540	.554
NOV	.534	.296	.	.	.486	.467
DEC	.511	.422	.487	.399	.	.
MAGNESIUM (MG/L)			DET'N LIMIT = .050		GUIDELINE = 30 (F2)	
MAR	8.400	8.200	.	.	8.300	8.400
APR	8.900	8.800	9.000	8.900	8.800	8.800
MAY	8.700	8.500	8.600	8.500	8.600	8.500
JUN	9.000	8.700	8.500	8.900	9.100	8.900
JUL	8.100	8.100	.	.	8.000	8.000
SEP	8.700	8.300	.	.	8.300	8.200
OCT	8.900	8.950	.	.	8.750	9.050
NOV	9.000	9.000	.	.	8.700	8.600
DEC	8.500	8.450	8.550	8.450	.	.
SODIUM (MG/L)			DET'N LIMIT = .200		GUIDELINE = 200 (C3)	
MAR	8.600	9.800	.	.	9.600	9.200
APR	8.600	10.000	10.600	10.400	10.200	10.200
MAY	8.000	9.200	9.400	9.400	9.600	9.600
JUN	9.000	9.600	9.800	9.800	10.000	10.000
JUL	8.800	9.800	.	.	10.000	10.000
SEP	8.400	9.800	.	.	10.000	10.000
OCT	9.000	10.300	.	.	10.300	10.100
NOV	8.900	10.200	.	.	10.400	10.700
DEC	6.600	8.300	8.100	8.400	.	.
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002		GUIDELINE = .05 (F2)	
MAR	.002 <T	BDL	.	.	.004 <T	.004 <T
APR	.012	.002 <T	.008 <T	.002 <T	.006 <T	.002 <T
MAY	.008 <T	BDL	BDL	BDL	BDL	BDL
JUN	.042	BDL	BDL	BDL	.002	BDL
JUL	.056	BDL	.	.	.004 <T	BDL
SEP	.016	BDL	.	.	BDL	BDL
OCT	.006	.002	.	.	.002	.002
NOV	.016	.002 <T	.	.	.010	.002 <T
DEC	BDL	BDL	BDL	BDL	.	.
NITRITE (MG/L)			DET'N LIMIT = 0.001		GUIDELINE = 1.000 (A1)	
MAR	.005	.003 <T	.	.	.001 <T	.001 <T
APR	.002 <T	BDL	.001 <T	BDL	.001 <T	BDL
MAY	.004 <T	.001 <T	.001 <T	.001 <T	.001 <T	.002 <T
JUN	.011	.004 <T	.004 <T	.004 <T	.005	.006
JUL	.019	.001 <T	.	.	.002 <T	.001 <T

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1989

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
SEP	.003 <T	BDL	.	.	BDL	BDL
OCT	.003 <T	BDL	.	.	.002 <T	.001 <T
NOV	.014	.001 <T	.	.	.001 <T	.001 <T
DEC	.004 <T	.001 <T	.002 <T	.096	.	.
TOTAL NITRATES (MG/L)			DET'N LIMIT = .020		GUIDELINE = 10.000 (A1)	
MAR	.185	.150	.	.	.170	.170
APR	.220	.320	.320	.315	.275	.275
MAY	.120	.115	.110	.115	.130	.145
JUN	.065	.030	.040	.025	.010 <T	BDL
JUL	.120	.085	.	.	.075	.070
SEP	.080	.095	.	.	.105	.105
OCT	.185	.180	.	.	.130	.140
NOV	.170	.165	.	.	.115	.065
DEC	.200	.195	.195	.270	.	.
NITROGEN TOT KJELD (MG/L)			DET'N LIMIT = .020		GUIDELINE = N/A	
MAR	.240	.160	.	.	.150	.150
APR	.230	.150	.160	.140	.150	.150
MAY	.240	.160	.290	.170	.180	.160
JUN	.290	.160	.160	.140	.170	.160
JUL	.330	.180	.	.	.160	.150
SEP	.280	.160	.	.	.170	.160
OCT	.230	.150	.	.	.170	.150
NOV	.240	.150	.	.	.160	.110
DEC	.220	.170	.300	.170	.	.
PH (DMNSLESS)			DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)	
MAR	8.290	8.160	.	.	8.150	8.120
APR	8.350	8.270	8.300	8.320	8.210	8.290
MAY	8.380	8.390	8.370	8.370	8.350	8.370
JUN	8.220	8.190	8.220	8.220	8.200	8.240
JUL	8.290	8.280	.	.	8.310	8.330
SEP	8.350	8.270	.	.	8.330	8.340
OCT	8.350	8.330	.	.	8.310	8.340
NOV	8.380	8.190	.	.	8.320	8.300
DEC	8.350	8.310	8.320	8.250	.	.
PHOSPHORUS FIL REACT (MG/L)			DET'N LIMIT = .0005		GUIDELINE = N/A	
MAR	.000 <T	BDL	.	.	.	.
APR	.000 <T	BDL	.	.	.	.
MAY	.000 <T	BDL	.	.	.	.
JUN	BDL	BDL	.	.	.	.
JUL	.003	BDL	.	.	.	.
SEP	.000 <T	BDL	.	.	.	.
OCT	.001 <T	BDL	.	.	.	.

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DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1989

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
NOV	.001 <T	.000 <T	.	.	.	.
DEC	.003	BDL	.	.	.	.
PHOSPHORUS TOTAL (MG/L)			DET'N LIMIT = .002		GUIDELINE = .40 (F2)	
MAR	.013	.002 <T	.	.	.	.
APR	.011	.002 <T	.	.	.	.
MAY	.011	BDL	.	.	.	.
JUN	.016	.009 <T	.	.	.	.
JUL	.019	.005 <T	.	.	.	.
SEP	.013	.005 <T	.	.	.	.
OCT	.009 <T	BDL	.	.	.	.
NOV	.007 <T	BDL	.	.	.	.
DEC	.006 <T	BDL	.	.	.	.
SULPHATE (MG/L)			DET'N LIMIT = .200		GUIDELINE = 500. (A3)	
MAR	23.280	33.630	.	.	34.690	34.470
APR	24.250	34.400	36.140	35.980	35.580	35.540
MAY	23.280	33.730	31.850	31.660	32.300	32.580
JUN	22.220	30.730	30.330	30.370	30.680	30.440
JUL	22.480	30.990	.	.	31.220	31.420
SEP	23.260	32.050	.	.	32.370	32.310
OCT	23.760	31.740	.	.	31.200	31.950
NOV	25.380	35.160	.	.	35.260	34.560
DEC	24.510	32.640	32.020	31.790	.	.
TURBIDITY (FTU)			DET'N LIMIT = .02		GUIDELINE = 1.00 (A1)	
MAR	6.300	.850	.	.	.300	.300
APR	5.400	.310	.330	.270	.280	.410
MAY	1.760	.850	.650	.850	.820	.660
JUN	1.610	.570	.600	.360	.480	.630
JUL	3.500	.550	.	.	.630	.300
SEP	2.900	.240 <T	.	.	.390	.260
OCT	7.100	.260	.	.	.440	.330
NOV	3.800	.310	.	.	.280	.150 <T
DEC	5.600	.360	.650	.620	.	.

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DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1989

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
METALS						
SILVER (UG/L)				DET'N LIMIT = .020	GUIDELINE = 50. (A1)	
MAR	BDL	BDL	.	.	BDL	.050 <T
APR	.030 <T	.040 <T	.030 <T	BDL	.040 <T	.070 <T
MAY	.040 <T	.060 <T	.060 <T	.060 <T	BDL	.040 <T
JUN	BDL	.040 <T	BDL	BDL	BDL	BDL
JUL	BDL	.040 <T	.	.	BDL	.030 <T
SEP	BDL	BDL	.	.	BDL	BDL
OCT	BDL	BDL	.	.	BDL	BDL
NOV	BDL	BDL	.	.	BDL	BDL
DEC	BDL	BDL	BDL	BDL	.	.
ALUMINUM (UG/L)				DET'N LIMIT = .050	GUIDELINE = 100.(A4)	
MAR	51.040	93.960	.	.	38.280	39.440
APR	58.000	44.080	39.440	35.960	41.760	33.640
MAY	37.120	55.680	66.120	62.640	59.160	56.840
JUN	15.000	95.000	71.000	74.000	86.000	85.000
JUL	46.000	120.000	.	.	100.000	110.000
SEP	58.000	170.000	.	.	150.000	160.000
OCT	84.000	62.000	.	.	93.000	96.000
NOV	32.000	49.000	.	.	65.000	50.000
DEC	98.000	47.000	41.000	47.000	.	.
ARSENIC (UG/L)				DET'N LIMIT = 0.050	GUIDELINE = 50.0 (A1)	
MAR	.960 <T	.460 <T	.	.	.880 <T	.800 <T
APR	1.100	.890 <T	.750 <T	.920 <T	.860 <T	.730 <T
MAY	.500 <T	.460 <T	.340 <T	.120 <T	.140 <T	BDL
JUN	1.100	.940 <T	.830 <T	1.100	.860 <T	.710 <T
JUL	.780 <T	.350 <T	.	.	.400 <T	.420 <T
SEP	1.200	.780 <T	.	.	.780 <T	.910 <T
OCT	.810 <T	.260 <T	.	.	.430 <T	.380 <T
NOV	.810 <T	.450 <T	.	.	.490 <T	.470 <T
DEC	.990 <T	.270 <T	.120 <T	.180 <T	..	.
BARIUM (UG/L)				DET'N LIMIT = 0.020	GUIDELINE = 1000. (A1)	
MAR	24.000	21.000	.	.	21.000	21.000
APR	23.000	21.000	21.000	21.000	23.000	22.000
MAY	23.000	21.000	21.000	21.000	21.000	21.000
JUN	23.000	22.000	22.000	22.000	21.000	22.000
JUL	23.000	22.000	.	.	23.000	22.000
SEP	22.000	21.000	.	.	21.000	21.000
OCT	21.000	19.000	.	.	23.000	21.000
NOV	23.000	21.000	.	.	24.000	21.000
DEC	24.000	21.000	22.000	22.000	.	.
BORON (UG/L)				DET'N LIMIT = 0.200	GUIDELINE = 5000. (A1)	
MAR	31.000	28.000	.	.	72.000	71.000

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DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1989

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
APR	34.000	100.000	58.000	44.000	120.000	52.000
MAY	26.000	97.000	23.000	48.000	120.000	36.000
JUN	24.000	25.000	37.000	36.000	27.000	23.000
JUL	31.000	43.000	.	.	36.000	32.000
SEP	57.000	25.000	.	.	36.000	60.000
OCT	21.000	22.000	.	.	33.000	32.000
NOV	22.000	29.000	.	.	26.000	21.000
DEC	21.000	21.000	87.000	24.000	.	.
BERYLLIUM (UG/L)			DET'N LIMIT = 0.010 GUIDELINE = N/A			
MAR	BDL	BDL	.	.	.130 <T	.070 <T
APR	BDL	BDL	.060 <T	.020 <T	.130 <T	BDL
MAY	BDL	BDL	BDL	BDL	.020 <T	BDL
JUN	.040 <T	BDL	.060 <T	.060 <T	.060 <T	BDL
JUL	.060 <T	.100 <T	.	.	.080 <T	.050 <T
SEP	BDL	BDL	.	.	BDL	.020 <T
OCT	BDL	.030 <T	.	.	.030 <T	.030 <T
NOV	.040 <T	.020 <T	.	.	.020 <T	.020 <T
DEC	BDL	BDL	BDL	BDL	.	.
CADMIUM (UG/L)			DET'N LIMIT = 0.050 GUIDELINE = 5.000 (A1)			
MAR	BDL	BDL	.	.	BDL	BDL
APR	.070 <T	BDL	.190 <T	BDL	.270 <T	.070 <T
MAY	BDL	BDL	BDL	BDL	BDL	BDL
JUN	.100 <T	BDL	BDL	BDL	.120 <T	BDL
JUL	.070 <T	BDL	.	.	.160 <T	.080 <T
SEP	BDL	BDL	.	.	.190 <T	BDL
OCT	BDL	BDL	.	.	BDL	BDL
NOV	BDL	.110 <T	.	.	BDL	BDL
DEC	.070 <T	.070 <T	.120 <T	BDL	.	.
COBALT (UG/L)			DET'N LIMIT = 0.020 GUIDELINE = N/A			
MAR	.070 <T	.260 <T	.	.	.150 <T	.160 <T
APR	.130 <T	.150 <T	.160 <T	.150 <T	.130 <T	.120 <T
MAY	.030 <T	.060 <T	.030 <T	BDL	BDL	BDL
JUN	.100 <T	.090 <T	.060 <T	BDL	.060	.050 <T
JUL	.260 <T	.240 <T	.	.	.210	.200 <T
SEP	.160 <T	.110 <T	.	.	.130 <T	.110 <T
OCT	.140 <T	.050 <T	.	.	.060 <T	.040 <T
NOV	.150 <T	.110 <T	.	.	.120 <T	.180 <T
DEC	.080 <T	.060 <T	.030 <T	.030 <T	.	.
CHROMIUM (UG/L)			DET'N LIMIT = 0.100 GUIDELINE = 50. (A1)			
MAR	1.400	.440 <T	.	.	6.800	6.400
APR	.610 <T	3.400	1.400	.860 <T	3.900	1.200
MAY	BDL	6.100	.130 <T	2.100	7.600	1.200

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1989

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
JUN	.790 <T	.430 <T	3.000	3.400	.950 <T	.560 <T
JUL	2.300	4.900	.	.	3.600	2.400
SEP	4.700	.560 <T	.	.	1.900	5.200
OCT	.530 <T	.440 <T	.	.	4.000	3.600
NOV	.370 <T	.450 <T	.	.	.430 <T	.350 <T
DEC	BDL	BDL	.650 <T	.540 <T	.	.
COPPER (UG/L)				DET'N LIMIT = .100 GUIDELINE = 1000 (A3)		
MAR	3.000	1.500	.	.	42.000	23.000
APR	1.700	1.100	140.000	16.000	230.000	29.000
MAY	1.800	.990 <T	85.000	10.000	27.000	14.000
JUN	1.800	1.200	36.000	6.000	56.000	16.000
JUL	3.900	1.800	.	.	190.000	28.000
SEP	2.200	1.300	.	.	180.000	24.000
OCT	1.600	.990 <T	.	.	270.000	28.000
NOV	2.200	1.700	.	.	200.000	34.000
DEC	6.700	1.600 <T	390.000	26.000	.	.
IRON (UG/L)				DET'N LIMIT = 4.000 GUIDELINE = 300. (A3)		
MAR	53.000	18.000 <T	.	.	BDL	BDL
APR	63.000	BDL	13.000 <T	BDL	BDL	BDL
MAY	28.000 <T	BDL	BDL	BDL	BDL	BDL
JUN	36.000 <T	14.000 <T	6.500 <T	BDL	20.000 <T	14.000 <T
JUL	66.000	7.700 <T	.	.	9.800 <T	11.000 <T
SEP	70.000	5.400 <T	.	.	11.000 <T	8.900 <T
OCT	110.000	BDL	.	.	BDL	BDL
NOV	61.000	5.500 <T	.	.	BDL	BDL
DEC	83.000	8.800 <T	12.000 <T	8.600 <T	.	.
MERCURY (UG/L)				DET'N LIMIT = 0.010 GUIDELINE = 1.000 (A1)		
MAR	BDL	BDL	.	.	.	.030 <T
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	.030 <T	.	.020 <T	.	.020 <T
JUL	BDL	BDL	.	.	.	BDL
SEP	BDL	BDL	.	.	.	BDL
OCT	.020 <T	.020 <T	.	.	.	.020 <T
NOV	.020 <T	.020 <T	.	.	.	.020 <T
DEC	.020 <T	.030 <T	.	.030 <T	.	.
MANGANESE (UG/L)				DET'N LIMIT = .050 GUIDELINE = 50.0 (A3)		
MAR	3.100	1.600	.	.	.700	.990
APR	4.500	1.900	.750	.600	.780	.730
MAY	3.300	1.000	.540	.260 <T	.590	.480 <T
JUN	3.300	1.000	.440 <T	.110 <T	1.100	1.800
JUL	7.300	2.100	.	.	1.300	1.100

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1989

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
SEP	7.500	2.200	.	.	.970	.790
OCT	7.000	1.400	.	.	1.200	1.000
NOV	5.100	2.200	.	.	.720	.450 <T
DEC	4.700	2.100	1.300	1.100	.	.
MOLYBDENUM (UG/L)				DET'N LIMIT = 0.020 GUIDELINE = N/A		
MAR	1.500	1.800	.	.	1.500	1.500
APR	1.400	1.600	1.800	1.700	1.700	1.700
MAY	1.600	1.300	1.500	1.300	1.500	1.500
JUN	1.400	1.500	1.800	1.900	1.500	1.500
JUL	1.400	1.600	.	.	1.600	1.600
SEP	1.400	1.500	.	.	1.700	1.300
OCT	1.000	1.100	.	.	1.300	1.200
NOV	1.100	1.100	.	.	1.200	1.300
DEC	1.000	1.200	1.200	1.400	.	.
NICKEL (UG/L)				DET'N LIMIT = 0.100 GUIDELINE = 50. (F3)		
MAR	.730 <T	BDL	.	.	1.400 <T	1.500 <T
APR	.610 <T	.770 <T	1.500 <T	.840 <T	.650 <T	.760 <T
MAY	BDL	BDL	BDL	BDL	BDL	BDL
JUN	BDL	.580 <T	.590 <T	.910 <T	.730 <T	1.200 <T
JUL	1.400 <T	1.500 <T	.	.	2.300	1.300 <T
SEP	1.200 <T	1.300 <T	.	.	1.900 <T	1.100 <T
OCT	.980 <T	.640 <T	.	.	1.400 <T	.940 <T
NOV	1.700 <T	3.200	.	.	2.100	1.700 <T
DEC	BDL	.550 <T	2.000 <T	BDL	.	.
LEAD (UG/L)				DET'N LIMIT = 0.050 GUIDELINE = 50. (A1)		
MAR	.030 <T	.640	.	.	.870	.630
APR	.190 <T	BDL	3.000	.660	7.200	1.100
MAY	.160 <T	BDL	4.100	.520	.700	.400
JUN	.290	.320	1.800	.560	1.200	.410
JUL	.450	.180 <T	.	.	16.000	2.000
SEP	.460	.220	.	.	6.000	1.200
OCT	.570	.060 <T	.	.	6.900	.770
NOV	.200 <T	.190 <T	.	.	3.900	.920
DEC	.160 <T	BDL	7.500	.290 <T	.	.
ANTIMONY (UG/L)				DET'N LIMIT = .050 GUIDELINE = 146. (D4)		
MAR	.580	1.000	.	.	.830	.840
APR	.660	.680	.820	.700	.750	.740
MAY	.730	.720	.890	.760	.760	.710
JUN	.820	.740	.840	.930	.860	.850
JUL	.990	1.100	.	.	.880	.910
SEP	.720	.700	.	.	.640	.660
OCT	.480	.570	.	.	.610	.530

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1989

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
NOV	.440	.400	.	.	.460	.340
DEC	.570	.570	.480 <T	.540	.	.
SELENIUM (UG/L)				DET'N LIMIT = 0.200 GUIDELINE = 10. (A1)		
MAR	1.600 <T	3.400 <T	.	.	5.600 <T	5.800 <T
APR	.430 <T	4.000 <T	3.100 <T	3.100 <T	5.600 <T	2.000 <T
MAY	BDL	4.800 <T	6.300 <T	3.700 <T	4.700 <T	7.100 <T
JUN	2.800 <T	3.500 <T	4.400 <T	5.500	7.400	6.000
JUL	BDL	1.100 <T	.	.	3.400 <T	4.000 <T
SEP	1.100 <T	1.500 <T	.	.	3.400 <T	4.600 <T
OCT	BDL	BDL	.	.	BDL	BDL
NOV	BDL	BDL	.	.	1.300 <T	BDL
DEC	BDL	1.200 <T	BDL	BDL	.	.
STRONTIUM (UG/L)				DET'N LIMIT = .050 GUIDELINE = N/A		
MAR	190.000	170.000	.	.	160.000	170.000
APR	180.000	190.000	210.000	210.000	200.000	210.000
MAY	160.000	160.000	150.000	160.000	160.000	160.000
JUN	180.000	170.000	190.000	190.000	190.000	190.000
JUL	170.000	170.000	.	.	170.000	170.000
SEP	170.000	160.000	.	.	170.000	170.000
OCT	170.000	160.000	.	.	180.000	170.000
NOV	170.000	160.000	.	.	180.000	160.000
DEC	180.000	170.000	180.000	180.000	.	.
TITANIUM (UG/L)				DET'N LIMIT = .050 GUIDELINE = N/A		
MAR	6.900	7.400	.	.	4.200	3.900
APR	7.800	6.100	6.300	6.400	6.800	7.100
MAY	5.500	4.400	4.800	4.700	4.900	4.700
JUN	5.700	5.300	4.100	2.900	4.700	4.700
JUL	6.800	7.600	.	.	5.400	5.600
SEP	11.000	8.500	.	.	8.900	8.600
OCT	6.400	3.400	.	.	3.900	3.400
NOV	4.700	3.000	.	.	3.600	3.100
DEC	7.800	4.000 <T	5.200	3.800 <T	.	.
THALLIUM (UG/L)				DET'N LIMIT = .010 GUIDELINE = 13. (D4)		
MAR	.060 <T	.040 <T	.	.	BDL	BDL
APR	BDL	.050 <T	.030 <T	BDL	.080 <T	BDL
MAY	.060 <T	.060 <T	.080 <T	.060 <T	BDL	.020 <T
JUN	BDL	BDL	BDL	BDL	BDL	BDL
JUL	.050 <T	.020 <T	.	.	.030 <T	.050 <T
SEP	BDL	.020 <T	.	.	BDL	BDL
OCT	BDL	BDL	.	.	BDL	BDL
NOV	.040 <T	BDL	.	.	.030 <T	BDL
DEC	BDL	BDL	BDL	BDL	.	.

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DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1989

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
URANIUM (UG/L)				DET'N LIMIT = .020	GUIDELINE = 100.(B1)	
MAR	.480	.210	.	.	.220	.190 <T
APR	.430	.240	.240	.180 <T	.200 <T	.230
MAY	.490	.230	.210	.250	.220	.230
JUN	.580	.290	.340	.430	.450	.410
JUL	.570	.280	.	.	.210	.070 <T
SEP	.490	.210	.	.	.180 <T	.220
OCT	.280	.110 <T	.	.	.070 <T	.080 <T
NOV	.290	.080 <T	.	.	.100 <T	.060 <T
DEC	.330 <T	.140 <T	.130 <T	.130 <T	.	.
VANADIUM (UG/L)				DET'N LIMIT = .050	GUIDELINE = N/A	
MAR	.380 <T	.290 <T	.	.	.220 <T	.260 <T
APR	.340 <T	.270 <T	.320 <T	.290 <T	.320 <T	.250 <T
MAY	.310 <T	.130 <T	.230 <T	.190 <T	.190 <T	.200 <T
JUN	.220 <T	.190 <T	.290 <T	.300 <T	.330 <T	.320 <T
JUL	.410 <T	.320 <T	.	.	.390 <T	.420 <T
SEP	.360 <T	.330 <T	.	.	.280 <T	.350 <T
OCT	.270 <T	.360 <T	.	.	.280 <T	.320 <T
NOV	.260 <T	.390 <T	.	.	.310 <T	.270 <T
DEC	.470 <T	.410 <T	.170 <T	.190 <T	.	.
ZINC (UG/L)				DET'N LIMIT = .001	GUIDELINE = 5000. (A3)	
MAR	2.300	2.100	.	.	7.500	4.300
APR	1.900	1.300	22.000	2.400	28.000	2.600
MAY	2.700	2.000	6.500	2.800	5.600	2.900
JUN	3.200	2.500	4.700	2.800	28.000	2.900
JUL	3.400	2.000	.	.	48.000	5.100
SEP	2.400	1.900	.	.	15.000	2.400
OCT	1.800	1.000 <T	.	.	53.000	2.700
NOV	2.700	2.800	.	.	28.000	7.100
DEC	2.500	1.100 <T	75.000	2.700	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1989

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PESTICIDES & PCB						
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 700 (G)	
MAR	1.000 <T	1.000 <T	.	.	.	2.000 <T
APR	BDL	BDL	.	BDL	.	1.000 <T
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	1.000 <T	1.000 <T	.	.	.	1.000 <T
SEP	BDL	1.000 <T	.	.	.	1.000 <T
OCT	BDL	BDL	.	.	.	BDL
NOV	1.000 <T	BDL	.	.	.	BDL
DEC	BDL	1.000 <T	.	1.000 <T	.	.
ATRAZINE (NG/L)			DET'N LIMIT = 50.00		GUIDELINE = 60000 (B3)	
MAR	BDL	BDL	.	.	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	.	.	BDL
SEP	BDL	200.000 <T	.	.	.	INR
OCT	BDL	BDL	.	.	.	.
NOV	BDL	BDL	.	.	.	.
DEC	BDL	BDL	.	.	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1989

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PHENOLICS (UG/L PHENOLICS)			DET'N LIMIT = 0.2		GUIDELINE = 2.00 (A3)	
MAR	1.400	1.000	.	.	.	.
APR	1.600	1.200	.	.	.	.
MAY	1.000	1.200	.	.	.	.
JUN	.	.600 <T	.	.	.	.
JUL	.600 <T	.600 <T	.	.	.	.
SEP	1.600	1.600	.	.	.	.
OCT	3.200	.600 <T	.	.	.	.
NOV	1.000 <T	.800 <T	.	.	.	.
DEC	BDL	BDL	.	.	.	.

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1989

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
VOLATILES						
BENZENE (UG/L)				DET'N LIMIT = .050	GUIDELINE = 5.0 (B1)	
MAR	.050 <T	BDL	.	.	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	.	.	BDL
SEP	BDL	.050 <T	.	.	.	IU
OCT	BDL	BDL	.	.	.	ILA
NOV	BDL	BDL	.	.	.	BDL
DEC	BDL	.100 <T	.	BDL	.	.
TOLUENE (UG/L)				DET'N LIMIT = .050	GUIDELINE = 24.0 (B4)	
MAR	.100 <T	BDL	.	.	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	.050 <T	.	BDL
JUN	BDL	.100 <T	.	.050 <T	.	.100 <T
JUL	BDL	.100 <T	.	.	.	.100 <T
SEP	.050 <T	.100 <T	.	.	.	IU
OCT	BDL	.050 <T	.	.	.	ILA
NOV	BDL	.100 <T	.	.	.	BDL
DEC	BDL	.150 <T	.	.050 <T	.	.
ETHYLBENZENE (UG/L)				DET'N LIMIT = .050	GUIDELINE = 2.4 (B4)	
MAR	BDL	.050 <T	.	.	.	.050 <T
APR	BDL	.050 <T	.	BDL	.	BDL
MAY	BDL	BDL	.	.050 <T	.	BDL
JUN	BDL	.050 <T	.	.100 <T	.	.100 <T
JUL	BDL	BDL	.	.	.	.050 <T
SEP	BDL	BDL	.	.	.	IU
OCT	BDL	BDL	.	.	.	ILA
NOV	BDL	BDL	.	.	.	BDL
DEC	BDL	.050 <T	.	.050 <T	.	.
M-XYLENE (UG/L)				DET'N LIMIT = .100	GUIDELINE = 300 (B4)	
MAR	BDL	BDL	.	.	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	.100 <T	.	BDL	.	.100 <T
JUL	BDL	BDL	.	.	.	BDL
SEP	BDL	BDL	.	.	.	IU
OCT	BDL	BDL	.	.	.	ILA
NOV	BDL	BDL	.	.	.	BDL
DEC	BDL	BDL	.	BDL	.	.
O-XYLENE (UG/L)				DET'N LIMIT = .050	GUIDELINE = 300 (B4)	
MAR	BDL	BDL	.	.	.	.050 <T

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1989

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
APR	BDL	.050 <T	.	BDL	.	.050 <T
MAY	BDL	BDL	.	.050 <T	.	.050 <T
JUN	BDL	.050 <T	.	BDL	.	BDL
JUL	BDL	BDL	.	.	.	BDL
SEP	.100 <T	BDL	.	.	.	IU
OCT	BDL	BDL	.	.	.	ILA
NOV	BDL	BDL	.	.	.	BDL
DEC	BDL	.050 <T	.	BDL	.	.
STYRENE (UG/L)				DET'N LIMIT = .050 GUIDELINE = 46.5 (D2)		
MAR	.100 <T	.050 <T	.	.	.	BDL
APR	BDL	.100 <T	.	BDL	.	.050 <T
MAY	BDL	BDL	.	.200 <T	.	BDL
JUN	.100 <T	BDL	.	.150 <T	.	.100 <T
JUL	BDL	.050 <T	.	.	.	.200 <T
SEP	BDL	.100 <T	.	.	.	IU
OCT	.100 <T	BDL	.	.	.	ILA
NOV	BDL	.100 <T	.	.	.	.200 <T
DEC	BDL	.050 <T	.	.100 <T	.	.
CHLOROFORM (UG/L)				DET'N LIMIT = .100 GUIDELINE = 350 (A1+)		
MAR	BDL	8.800	.	.	.	18.400
APR	BDL	13.400	.	15.000	.	16.700
MAY	BDL	9.000	.	16.100	.	13.800
JUN	BDL	22.500	.	25.100	.	26.200
JUL	.200 <T	12.900	.	.	.	14.300
SEP	.200 <T	10.800	.	.	.	IU
OCT	BDL	16.400	.	.	.	ILA
NOV	BDL	14.200	.	.	.	23.600
DEC	BDL	13.500	.	16.400	.	.
111, TRICHLOROETHANE (UG/L)				DET'N LIMIT = .020 GUIDELINE = 200 (D1)		
MAR	.040 <T	.140 <T	.	.	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	.	.	BDL
SEP	BDL	BDL	.	.	.	IU
OCT	BDL	BDL	.	.	.	ILA
NOV	BDL	BDL	.	.	.	BDL
DEC	BDL	BDL	.	BDL	.	.
DICHLOROBROMOMETHANE (UG/L)				DET'N LIMIT = .050 GUIDELINE = 350 (A1+)		
MAR	BDL	7.150	.	.	.	10.900
APR	BDL	10.500	.	10.600	.	11.350
MAY	BDL	6.450	.	9.700	.	8.900

TABLE 5

DRINKING WATER SURVEILLANCE PROGRAM HALDIMAND/NORFOLK WSS 1989

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
JUN	BDL	11.600	.	13.700	.	14.000
JUL	BDL	9.150	.	.	.	8.950
SEP	BDL	7.100	.	.	.	IU
OCT	BDL	9.850	.	.	.	ILA
NOV	BDL	9.250	.	.	.	12.200
DEC	BDL	8.300	.	11.050	.	.
CHLORODIBROMOMETHANE (UG/L)				DET'N LIMIT = .100	GUIDELINE = 350 (A1+)	
MAR	BDL	4.700	.	.	.	6.900
APR	BDL	6.300	.	6.700	.	6.600
MAY	BDL	4.300	.	6.200	.	5.300
JUN	BDL	7.000	.	8.100	.	8.100
JUL	BDL	6.100	.	.	.	6.000
SEP	BDL	5.200	.	.	.	IU
OCT	BDL	5.600	.	.	.	ILA
NOV	BDL	5.700	.	.	.	6.800
DEC	BDL	4.600	.	6.200	.	.
BROMOFORM (UG/L)				DET'N LIMIT = .200	GUIDELINE = 350 (A1+)	
MAR	BDL	1.200 <T	.	.	.	1.200 <T
APR	BDL	1.000 <T	.	1.000 <T	.	.800 <T
MAY	BDL	.600 <T	.	1.000 <T	.	.800 <T
JUN	BDL	1.200 <T	.	1.600 <T	.	1.800 <T
JUL	BDL	.800 <T	.	.	.	.800 <T
SEP	BDL	1.000 <T	.	.	.	IU
OCT	BDL	1.200 <T	.	.	.	ILA
NOV	BDL	1.200 <T	.	.	.	1.400 <T
DEC	BDL	.800 <T	.	1.000 <T	.	.
TOTL TRIHALOMETHANES (UG/L)				DET'N LIMIT = .500	GUIDELINE = 350 (A1)	
MAR	BDL	21.850	.	.	.	37.400
APR	BDL	31.200	.	33.300	.	35.450
MAY	BDL	20.350	.	33.000	.	28.800
JUN	BDL	42.300	.	48.500	.	46.100
JUL	BDL	28.950	.	.	.	30.050
SEP	BDL	24.100	.	.	.	IU
OCT	BDL	33.050	.	.	.	ILA
NOV	BDL	30.350	.	.	.	44.000
DEC	BDL	27.250	.	34.700	.	.

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

Table 6

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
STANDARD PLATE COUNT MEMBRANE FILTRATION	CT/ML	0	500/ML (A1)
P/A BOTTLE		0	0 (A1*)
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100mL (A1)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
CHLOROAROMATICS			
HEXACHLOROBUTADIENE	NG/L	1.000	450. (D4)
1,2,3-TRICHLOROBENZENE	NG/L	5.000	10000 (I)
1,2,3,4-TETRACHLOROBENZENE	NG/L	1.000	10000 (I)
1,2,3,5-TETRACHLOROBENZENE	NG/L	1.000	10000 (I)
1,2,4-TRICHLOROBENZENE	NG/L	5.000	10000 (I)
1,2,4,5-TETRACHLOROBENZENE	NG/L	1.000	38000 (D4)
1,3,5-TRICHLOROBENZENE	NG/L	5.000	10000 (D4)
HEXACHLOROBENZENE	NG/L	1.0	10. (C1)
HEXACHLOROETHANE	NG/L	1.000	1900. (D4)
OCTACHLOROSTYRENE	NG/L	1.000	N/A
PENTACHLOROBENZENE	NG/L	1.000	74000 (D4)
2,3,6-TRICHLOROTOLUENE	NG/L	5.000	N/A
2,4,5-TRICHLOROTOLUENE	NG/L	5.000	N/A
2,6,A-TRICHLOROTOLUENE	NG/L	5.000	N/A
CHLOROPHENOLS			
2,3,4-TRICHLOROPHENOL	NG/L	50.	N/A
2,3,4,5-TETRACHLOROPHENOL	NG/L	50.	N/A
2,3,5,6-TETRACHLOROPHENOL	NG/L	50.	N/A
2,4,5-TRICHLOROPHENOL	NG/L	50.	2600000 (D4)
2,4,6-TRICHLOROPHENOL	NG/L	50.	2000. (B4)
PENTACHLOROPHENOL	NG/L	50.	30000. (B4)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	N/A	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	N/A	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	N/A	N/A
FIELD PH	DMSNLESS	N/A	6.5-8.5 (A4)
FIELD TEMPERATURE	^{o}C	N/A	<15 ^{o}C (A1)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	.200	30-500 (A4)
CALCIUM	MG/L	.100	100. (F2)
CYANIDE	MG/L	.001	.20 (A1)
CHLORIDE	MG/L	.200	250. (A3)
COLOUR	TCU	.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.	400. (F2)
FLUORIDE	MG/L	.01	2.4 (A1)
HARDNESS	MG/L	.50	80-100 (A4)
MAGNESIUM	MG/L	.05	30. (F2)

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
NITRITE	MG/L	.001	1.0 (A1)
TOTAL NITRATES	MG/L	.02	10. (A1)
NITROGEN TOTAL KJELDAHL	MG/L	.02	N/A
PH	DMSNLESS	N/A	6.5-8.5(A4)
PHOSPHORUS FIL REACT	MG/L	.0005	N/A
PHOSPHORUS TOTAL	MG/L	.002	.40(F2)
TOTAL SOLIDS	MG/L	1.	500. (A3)
TURBIDITY	FTU	.02	1.0 (A1)
METALS			
ALUMINUM	UG/L	.050	100. (A4)
ANTIMONY	UG/L	.050	10. (F3)
ARSENIC	UG/L	.050	50. (A1)
BARIUM	UG/L	.020	1000. (A1)
BORON	UG/L	.200	5000. (A1)
BERYLLIUM	UG/L	.010	0.20 (H)
CADMIUM	UG/L	.050	5.0 (A1)
COBALT	UG/L	.020	1000. (H)
CHROMIUM	UG/L	.100	50. (A1)
COPPER	UG/L	.100	1000. (A3)
IRON	UG/L	5.0	300. (A3)
MERCURY	UG/L	.01	1.0 (A1)
MANGANESE	UG/L	.050	50. (A3)
MOLYBDENUM	UG/L	.020	500. (H)
NICKEL	UG/L	.100	50. (F3)
LEAD	UG/L	.020	50. (A1)
SELENIUM	UG/L	.200	10. (A1)
SILVER	UG/L	.020	50. (A1)
STRONTIUM	UG/L	.100	2000. (H)
THALLIUM	UG/L	.010	13. (D4)
TITANIUM	UG/L	.100	N/A
URANIUM	UG/L	.020	20. (A2)
VANADIUM	UG/L	.020	100. (H)
ZINC	UG/L	.020	5000. (A3)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	.2	2.0 (A3)
PESTICIDES & PCB			
ALDRIN	NG/L	1.0	700. (A1)
AMETRINE	NG/L	50.	300000. (D3)
ATRAZINE	NG/L	50.	60000. (B3)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700. (G)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300. (G)
GAMMA HEXACHLOROCYCLOHEXANE(LINDANE)	NG/L	1.0	4000. (A1)
ALPHA CHLORDANE	NG/L	2.0	7000. (A1)
GAMMA CHLORDANE	NG/L	2.0	7000. (A1)
BLADEX	NG/L	100.	10000. (B3)
DIELDRIN	NG/L	2.0	700. (A1)
METHOXYCHLOR	NG/L	5.0	900000. (B1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000. (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	4.0	74000. (D4)
ENDRIN	NG/L	4.0	200. (A1)
ENDOSULFAN SULPHATE(THIODAN SULPHATE)	NG/L	4.0	N/A
HEPTACHLOR EPOXIDE	NG/L	1.0	3000. (A1)

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE	
HEPTACHLOR	NG/L	1.0	3000.	(A1)
METOLACHLOR	NG/L	500.	50000.	(B3)
MIREX	NG/L	5.0	N/A	
OXYCHLORDANE	NG/L	2.0	N/A	
O,P-DDT	NG/L	5.0	30000.	(A1)
PCB	NG/L	20.0	3000.	(A2)
O,P-DDD	NG/L	5.0	N/A	
PPDDE	NG/L	1.0	30000.	(A1)
PPDDT	NG/L	5.0	30000.	(A1)
ATRATONE	NG/L	50.	N/A	
ALACHLOR	NG/L	500.	35000.	(D2)
PROMETONE	NG/L	50.	52500.	(D3)
PROPAZINE	NG/L	50.	16000.	(D2)
PROMETRYNE	NG/L	50.	1000.	(B3)
SENCOR (METRIBUZIN)	NG/L	100.	80000.	(B2)
SIMAZINE	NG/L	50.	10000.	(B3)
POLYAROMATIC HYDROCARBONS				
PHENANTHRENE	NG/L	10.0	N/A	
ANTHRACENE	NG/L	1.0	N/A	
FLUORANTHENE	NG/L	20.0	42000.	(D4)
PYRENE	NG/L	20.0	N/A	
BENZO(A)ANTHRACENE	NG/L	20.0	N/A	
CHRYSENE	NG/L	50.0	N/A	
DIMETHYL BENZO(A)ANTHRACENE	NG/L	5.0	N/A	
BENZO(E)PYRENE	NG/L	50.0	N/A	
BENZO(B)FLUORANTHENE	NG/L	10.0	N/A	
PERYLENE	NG/L	10.0	N/A	
BENZO(K)FLUORANTHENE	NG/L	1.0	N/A	
BENZO(A)PYRENE	NG/L	5.0	10.	(B1)
BENZO(G,H,I)PERYLENE	NG/L	20.0	N/A	
DIBENZO(A,H)ANTHRACENE	NG/L	10.0	N/A	
INDENO(1,2,3-C,D)PYRENE	NG/L	20.0	N/A	
BENZO(B)CHRYSENE	NG/L	2.0	N/A	
CORONENE	NG/L	10.0	N/A	
SPECIFIC PESTICIDES				
TOXAPHENE	NG/L	N/A	5000.	(A1)
2,4,5-TRICHLOROBUTYRIC ACID (2,4,5-T)	NG/L	50.	200000.	(B4)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000.	(A1)
2,4-DICHLORORPHENOXYBUTYRIC ACID	NG/L	200.	18000.	(B3)
2,4-D PROPIONIC ACID	NG/L	100.	N/A	
DICAMBA	NG/L	100.	120000.	(B1)
PICLORAM	NG/L	100.	190000.	(B3)
SILVEX (2,4,5-TP)	NG/L	50.	10000.	(A1)
DIAZINON	NG/L	20.	20000.	(B1)
DICHLOROVOS	NG/L	20.	N/A	
DURSBAN	NG/L	20.	N/A	
ETHION	NG/L	20.	35000.	(G)
GUTHION(AZINPHOSMETHYL)	NG/L	N/A	20000.	(B1)
MALATHION	NG/L	20.	190000.	(B1)
MEVINPHOS	NG/L	20.	N/A	
METHYL PARATHION	NG/L	50.	7000.	(A1)
METHYLTRITHION	NG/L	20.	N/A	
PARATHION	NG/L	20.	50000.	(B1)

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
PHORATE (THIMET)	NG/L	20.	2000. (B3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
AMINOCARB	NG/L	N/A	N/A
BENONYL	NG/L	N/A	N/A
BUX (METALKAMATE)	NG/L	2000.	N/A
CARBOFURAN	NG/L	2000.	90000. (B1)
CICP (CHLORPROPHAM)	NG/L	2000.	350000. (G)
DIALLATE	NG/L	2000.	30000. (H)
EPTAM	NG/L	2000.	N/A
IPC	NG/L	2000.	N/A
PROPOXUR (BAYGON)	NG/L	2000.	90000. (G)
SEVIN (CARBARYL)	NG/L	200.	90000. (B1)
SUTAN (BUTYLATE)	NG/L	2000.	245000. (D3)
VOLATILES			
BENZENE	UG/L	.050	5.0 (B1)
TOLUENE	UG/L	.050	24.0 (B4)
ETHYLBENZENE	UG/L	.050	2.4 (B4)
PARA-XYLENE	UG/L	.100	300. (B4)
META-XYLENE	UG/L	.100	300. (B4)
ORTHO-XYLENE	UG/L	.050	300. (B4)
1,1-DICHLOROETHYLENE	UG/L	.100	7.0 (D1)
ETHLYENE DIBROMIDE	UG/L	.05	.05 G)
METHYLENE CHLORIDE	UG/L	.500	50. (B1)
TRANS-1,2-DICHLOROETHYLENE	UG/L	.100	70. (D5)
1,1-DICHLOROETHANE	UG/L	.100	N/A
CHLOROFORM	UG/L	.100	350. (A1+)
1,1,1-TRICHLOROETHANE	UG/L	.020	200. (D1)
1,2-DICHLOROETHANE	UG/L	.050	5.0 (D1)
CARBON TETRACHLORIDE	UG/L	.200	5.0 (B1)
1,2-DICHLOROPROPANE	UG/L	.050	6.0 (D5)
TRICHLOROETHYLENE	UG/L	.100	50. (B1)
DICHLOROBROMOMETHANE	UG/L	.050	350. (A1+)
1,1,2-TRICHLOROETHANE	UG/L	.050	.60(D4)
CHLORODIBROMOMETHANE	UG/L	.100	350. (A1+)
TETRACHLOROETHYLENE	UG/L	.050	10.0 (C2)
BROMOFORM	UG/L	.200	350. (A1+)
1,1,2,2-TETRACHLOROETHANE	UG/L	.050	0.17(D4)
CHLOROBENZENE	UG/L	.100	60. (D5)
1,4-DICHLOROBENZENE	UG/L	.100	1.0 (B4)
1,3-DICHLOROBENZENE	UG/L	.100	130. (G)
1,2-DICHLOROBENZENE	UG/L	.050	3.0 (B4)
TRIFLUOROCHLOROTOLUENE	UG/L	.100	N/A
TOTAL TRIHALOMETHANES	UG/L	.500	350. (A1)
STYRENE	UG/L	.05	140. (D5)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality,
- a flagging mechanism for 'Objective' exceedence,
- a definition of contaminant levels and trends,
- a comprehensive background for remedial action,
- a framework for assessment of new contaminants,
- and an indication of treatment efficiency of plant processes.

Program

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. Currently, 44 plants are being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit. It is estimated that after 4 years of operation, the program will be monitoring 90 locations.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analysed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of the raw (ambient water) and the treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled.

Sampling is carried out by operational personnel who have been trained in the applicable procedures.

Comprehensive standardized procedures and Field Test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". All laboratory analyses are carried out by the MOE Laboratory Services Branch.

Data Reporting Mechanism

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP co-ordinator.

DWSP INPUTS AND OUTPUTS

The DWSP INPUTS and OUTPUTS are illustrated in Fig. 1.

PROGRAM INPUTS

PLANT AND DISTRIBUTION SYSTEM DESCRIPTION

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant

visit. During the initial assessment of the plant and distribution system, the questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The PLANT and DISTRIBUTION SYSTEM DESCRIPTION consists of the following seven components.

1. Process component inventory

All physical and chemical processes to which the water is subjected from the intake pipe to the consumers' tap (where possible), are documented. These include process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. Treatment chemicals

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. The chemical dosages applied on the day of sampling are recorded in DWSP.

3. Process control measurements

Documentation of in-plant monitoring of process parameters (turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in

this section. In-plant monitoring results are generally not retained in DWSP but are retained by the Water Treatment Plant.

4. Design flow and retention time

The hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. The maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. Distribution system description

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. Sampling system

Each plant is assessed for its adequacy in terms of sampling bacteriological, organic and inorganic parameters. The prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant,

preferably a lab area;

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes origin of the water, date sampling was initiated, size, length and material type (intake, discharge and tap), pump characteristics (model, type, capacity), and flow rate.

7. People

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate Ministry of Environment personnel associated with the plant.

FIELD DATA

The second major input to DWSP is field data.

Field data is collected at the plant and from the distribution system sites on the day of sampling. The field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used,

dosages, flow and retention time on the day of sampling as well as monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analysed according to standardized DWSP protocols to allow for interplant comparison.

LABORATORY ANALYTICAL DATA

The third major input to DWSP is Laboratory Analytical Data.

Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. The parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list but which may be of interest. The majority of the parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyse, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems

may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and, as methods change, notation will be made and intercomparison data documented.

PARAMETER REFERENCE INFORMATION

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analysed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database.

An example is shown in figure 2.

A written copy (hard version) of the Parameter Reference Information will be available in the near future and is a new and sophisticated enhancement to the DWSP.

PROGRAM OUTPUTS

There are four major program outputs: Query, Action Alert, Report Generation and the Annual Report.

QUERY

All DWSP information is easily accessed through the Query function. Anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

ACTION ALERTS

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the publication Ontario Drinking Water Objectives (ISBN 0-7729-2725-1 revised 1983). This publication contains health-related Maximum Acceptable Concentrations for thirty substances. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible, there is confirmation of an exceedance and remedial action is taken. This report supplies a history of the occurrence, of past exceedences at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, other agency guidelines, which are documented in the Parameter Reference

Information, may be used. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

REPORT GENERATION

Custom reports can be generated from DWSP to meet the needs of the regions and to respond to public requests.

ANNUAL REPORTS

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG. 1

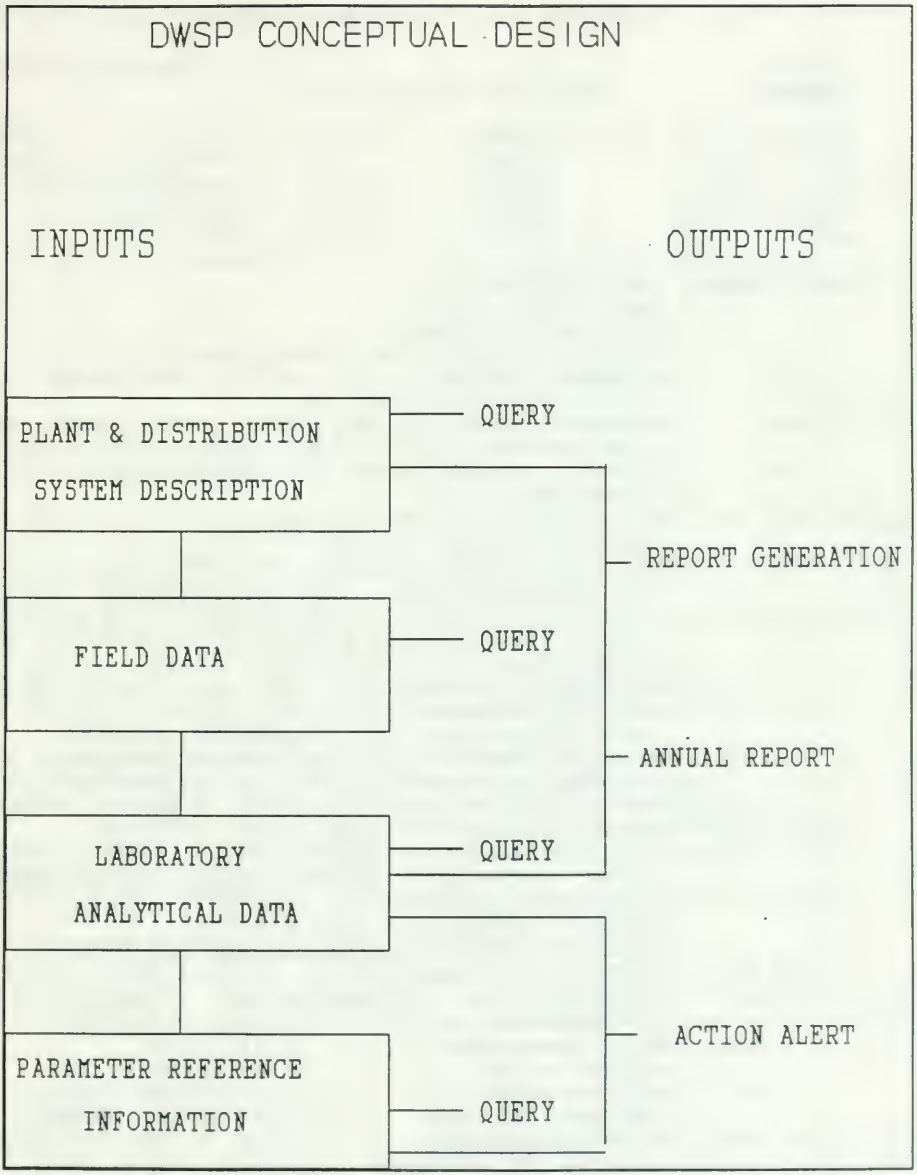
DWSP CONCEPTUAL DESIGN
INPUTS
OUTPUTS
PLANT & DISTRIBUTION SYSTEM DESCRIPTION
FIELD DATA
LABORATORY ANALYTICAL DATA
PARAMETER REFERENCE INFORMATION
QUERY
QUERY
QUERY
QUERY
REPORT GENERATION
ANNUAL REPORT
ACTION ALERT

FIG.2

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

(B2001P) PARAMETER REFERENCE
BENZENE

SOURCE	FROM	TO	METHOD	TARG	UNIT	NOTE
EPA C	86/04		NOMETH	.00	063000 UG/L	RMCL
EPAA C	80/11		NOMETH	6.60	063000 UG/L	
FERC C	84/05		NOMETH	1.00	063000 UG/L	
WHO C	84/01		NOMETH	10.00	064000 UG/L	

DESCRIPTION: NAME: BENZENE
CAS#: 71432
MOLECULAR FORMULAE: C_6H_6
DETECTION LIMIT: (FOR METHOD POCODO) 0.05 UG/L
SYNONYMS: BENZOLE, COAL NAPHTHA, CARBON OIL (27),
CYCLOHEXATRIENE (41)
CHARACTERISTICS: COLOURLESS TO LIGHT YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC, VAPOURS BURN WITH SMOKING FLAME (30)
PROPERTIES:
SOLUBILITY IN WATER: 1780-1800 MG/L AT 25 DEG C (41)
THRESHOLD ODOUR: NO DATA
THRESHOLD TASTE: 0.5 MG/L IN WATER (39)
ENVIRONMENTAL FATE: MAY BIOACCUMUALTE IN LIVING ORGANISMS, APPEARS TO BIOACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT HIGH LIPID CONTENT OR ARE MAJOR METABOLIC SITES (LIVER, BRAIN), SMALL QUANITIES EVAPORATE FROM SOIL OR DEGRADE QUICKLY
SOURCES: PETROLEUM REFINING, SOLVENT RECOVERY, COAL TAR DISTILLATION, FOOD PROCESSING, TANNING.
USES: PREPERATION OF ETHYL BENZENE USED AS A STYRENE MONOMER, DETERGENTS, NYLON, AS INTERMEDIATE IN PESTICIDE PRODUCTION, SOLVENT IN RUBBER INDUSTRY, DEGREASING AND CLEANSING AGENT, GASOLINE.
TOXICITY: RATING 4 (VERY TOXIC); ACUTE - IRRITATES MUCOUS MEMBRANES, SYMPTONS INCLUDE RESTLESSNESS, CONVULSIONS, DEPRESSION, RESPIRATORY FAILURE; CHRONIC - ANEMIA AND LEUKEMIA (45).
CARINOGENICITY: HUMAN CARCINOGEN AND MUTAGEN
REMOVAL: GAC ADSORPTION, PRECIPITATION WITH ALUM FOLLOWED BY SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION (41).
MOLECULAR WEIGHT: 78.12 GRAMS
MELTING POINT: 5.5 DEGREES C (27)
BOILING POINT: 80.1 DEGREES C (27)
SPECIFIC GRAVITY: 0.879 AT 20 DEGREES C (27)
VAPOUR PRESSURE: 100 MM AT 26.1 DEGREES C
HENRY'S LAW CONSTANT: 0.00555 ATM M_3/MOLE
LOG OCT./WATER PAR.COEFF: K=1.0 1/N=1.6 R=.97 PH=5.3

Appendix B

DWSP SAMPLING GUIDELINE

i) RAW and TREATED at PLANT

General Chemistry	-500 mL clear plastic bottle -rinse bottle with sample three times and discard water -fill to line
Bacti	-250 mL clear glass bottle with white seal on cap -do <u>not</u> rinse bottle; preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL clear plastic bottle with white lid -rinse bottle and cap three times, discard -fill to line -add 10 drops nitric acid (**Caution:** HNO_3 is corrosive)
Volatiles (OPOPUP)	-250 mL clear glass bottle -do <u>not</u> rinse bottle -tilt bottle when filling -fill bottle completely; there should be no air bubbles.
Organic (OWOC),(OWTRI),(OAPAHX)	-1 liter brown glass bottle per scan -do <u>not</u> rinse bottle -fill to approx. 1" from top -when 'special pesticides' are requested three extra bottles per sample must be submitted
Cyanide	-500 mL clear plastic bottle -do <u>not</u> rinse bottle -fill to approx. 1" from top -add 10 drops sodium hydroxide (**Caution:** NaOH is corrosive)

Mercury	-250 mL clear glass bottle -rinse bottle and cap three times, discard then fill to top of label -add 20 drops each nitric acid and potassium dichromate (**Caution:** HNO_3 and $K_2Cr_2O_7$ corrosive)
Phenols	-250 mL clear glass bottle -do <u>not</u> rinse bottle -fill to top of label as marked

<u>Steps</u>

1. Let cold water tap run for several minutes.
2. Record time in submission sheet.
3. Record teperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL clear palstic bottle -rinse bottle with sample three times and discard -fill to line
Metals	-500 mL clear plastic bottle with white lid -rinse bottle and cap three times, discard -fill to line -add 10 drops nitric acid (**Caution:** HNO_3 is corrosive)

Steps:

1. Record time on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL clear plastic bottle -rinse bottle with sample three times and discard water -fill to line
Bacti	-250 mL clear glass bottle with white seal on cap -do <u>not</u> rinse bottle; preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL clear plastic bottle with white lid -rinse bottle and cap three times, discard -fill to line -add 10 drops nitric acid (**Caution:** HNO_3 is corrosive)
Volatiles (OPOPUP)	-250 mL clear glass bottle -do <u>not</u> rinse bottle; preservative has been added -tilt bottle when filling -fill bottle completely; there should be no air bubbles
Organic (OWOC),(OWTRI)	-1 liter brown glass bottle per scan -do <u>not</u> rinse bottle: preservative has been added -fill to approx. 1" from top
Cyanide	-500 mL clear plastic bottle -do <u>not</u> rinse bottle: preservative has been added -fill to approx. 1" from top -add 10 drops sodium hydroxide (**Caution:** NaOH is corrosive)
Mercury	-250 mL clear glass bottle -rinse bottle and cap three times, discard then fill to top of label -add 20 drops each nitric acid and potassium dichromate (**Caution:** HNO_3 and $K_2Cr_2O_7$ corrosive)

Steps:

1. Record time on submission sheet.
2. Let cold water flow for five minutes.
3. Record temperature on submission sheet.
4. Fill all bottles as per instructions.
5. Record chlorine residuals (free, combined and total), tubidity and pH on submission sheet.